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APS/SDG&E Interconnection Project

Supplement to the
Draft Environmental Document



prepared by
U.S. Department of the Interior
Bureau of Land Management
and
Public Utilities Commission
State of California

SUPPLEMENT TO THE
DRAFT ENVIRONMENTAL DOCUMENT

ENVIRONMENTAL IMPACT STATEMENT (EIS)
ENVIRONMENTAL IMPACT REPORT (EIR)

APS/SDG&E INTERCONNECTION PROJECT

MARICOPA & YUMA COUNTIES, ARIZONA
and
IMPERIAL & SAN DIEGO COUNTIES, CALIFORNIA

Prepared By

Bureau of Land Management - Arizona State Office
and
Public Utilities Commission - State of California
CPUC A-59575 SCH 79061204

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ABSTRACT

Arizona Public Service (APS) and San Diego Gas & Electric (SDG&E) propose to construct and operate a 500kV transmission system interconnecting their power networks. The facilities would reduce oil dependence, provide access to the economy energy market, enhance system reliability and provide transmission capacity to help meet forecast power needs. Alternatives considered are no action, energy conservation and load management, alternative generation sources, alternative transmission systems and technologies, and the proposed action with routing alternatives. The major impacts of the proposed action would be the impacts of access roads, tower sites and staging areas on soils, vegetation, wildlife and cultural resources, and the impacts of the transmission lines themselves on aesthetic resources, other land uses and agricultural resources.

Comments Must Be Received By: June 26, 1981

TO: Public Agencies and Interested Parties:

Enclosed for your review and comment is the Supplement to the Draft Environmental Document for the proposed APS/SDG&E Interconnection Project. The decision to issue a supplement was a result of comments, suggestions and requests by individuals and various public entities and based on the following rationale:

1. Recommendations at public hearings and review comments for interests in the Yuma area and Imperial Valley, and residents in the Dulzura, Lakeside and Eucalyptus Hills areas.
2. Reevaluation of positions taken prior to the draft document by: U.S. Fish and Wildlife Service, Arizona Game and Fish Department and the Yuma Proving Ground.
3. Renegotiation with Quechan Tribe for alternative routes across the Fort Yuma Indian Reservation.
4. Subsequent changes in the project description including: new alternative routes, revised right-of-way width in California, new alternative substation sites, relocation of microwave sites, revised 161kV transmission system in Imperial Valley and new 69kV transmission system in Yuma area.
5. CPUC must notify property owners and adjacent property owners along new alternative routes now being considered. (Rule 17.1 of CPUC's Rules of Practice and Procedure.)

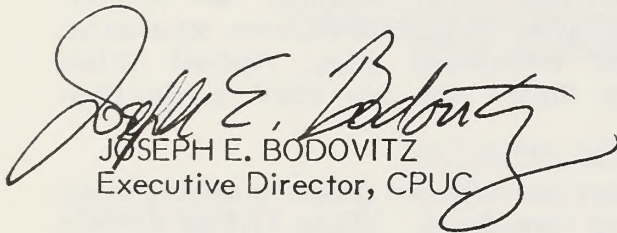
We would appreciate receiving your comments on the adequacy, completeness and accuracy of this supplement by June 26, 1981. Public hearings on the supplement will be held as follows:

<u>Date & Time</u>	<u>Location</u>	<u>Address</u>
June 16, 1981 - 7:00 PM	Yuma, Arizona	Civic and Convention Center, West Wing 1440 Desert Hill Drive
June 17, 1981 - 2:00-4:00 PM and 7:00-9:00 PM	El Centro, California	IID Auditorium 1284 Main Street
June 18, 1981 - 2:00-4:00 PM and 7:00-9:00 PM	San Diego, California	County Administration Center, Rm. 358 1600 Pacific Highway

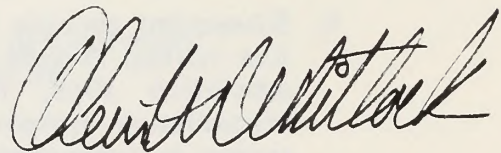
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Comments on this environmental supplement along with written and oral comments previously received on the Draft Environmental Document will be considered in preparing the final document and in the subsequent decision-making process. This supplement should be used with the draft which was released in August 1980. Both the supplement and the draft should be retained for possible use as part of the final document.

Comments should be sent to: State Director, Bureau of Land Management, 2400 Valley Bank Center, Phoenix Arizona 85073; or to Bill Y. Lee, Project Manager, California Public Utilities Commission, 350 McAllister Street, San Francisco, California 94102.



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APS/SDG&E Interconnection Project

Supplement to the
Draft Environmental Document



prepared by
U.S. Department of the Interior
Bureau of Land Management
and
Public Utilities Commission
State of California

April 1981

SUMMARY

SUMMARY

N.B. This summary replaces the summary in the DES.*

INTRODUCTION

Arizona Public Service (APS) and San Diego Gas & Electric (SDG&E) (the Applicants or utilities) propose to construct and operate a transmission system to interconnect the electric power networks of APS, SDG&E and the Imperial Irrigation District (IID). This environmental document is a joint submittal by the Bureau of Land Management (BLM) and California Public Utilities Commission (CPUC) in compliance with the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) for consideration with the utilities' applications for granting a Certificate of Public Convenience and Necessity and approval of a right-of-way.

PURPOSE AND NEED

The inordinate dependency of APS and SDG&E on oil and natural gas (70 percent and 82 percent respectively in the Yuma and San Diego service areas) as primary fuel-sources brings into question the reliability and economics of continuing to rely on oil and natural gas for providing base-load electricity to their respective service territories. In addition, forecasts by the California Energy Commission (CEC) for the SDG&E service area and by the Applicants indicate a growth in demand for electricity in the mid-to-late 1980s in the Applicants' respective service territories, which the utilities would be unable to meet without additional power and transmission capacity.

The proposed Project would (1) help reduce dependence on oil and natural gas for generating electricity consumed in the APS Lower Colorado River and SDG&E service territories; (2) furnish access to the economy energy market; (3) enhance system reliability; (4) and help meet the forecast need for power of both utilities by providing long-term firm transmission-capacity.

ALTERNATIVES INCLUDING THE PROPOSED ACTION

Five general alternatives were considered by the Applicants to meet the need for oil and gas displacement and additional power in their respective service territories: no action, energy conservation and load management, alternative generation sources, alternative transmission systems and technologies, and the proposed action with routing alternatives.

* APS/SDG&E Interconnection Project Draft Environmental Document (EIS/EIR), referred to in this document as the DES. The Supplement to the DES is referred to as the SDES.

NO ACTION

The no-action alternative (required for consideration under the NEPA regulations and defined here as the equivalent of the no-project alternative required under the CEQA regulations) has been interpreted in this environmental document to mean that no additional generating or transmission facilities beyond those included in their current resource plans would be constructed by APS or SDG&E. The utilities would, however, attempt to meet their need for additional power in San Diego and Yuma with existing facilities and various forms of mitigating measures to compensate for the anticipated shortfall in the supply of electric power, but would be unable to meet their objective for oil and gas displacement.

Advantages of the no-action alternative would include the saving of construction costs for new facilities and the preclusion of associated environmental impacts. These advantages would have to be weighed, however, against the disadvantages that would result from or in spite of mitigating measures, which include increased generation from existing oil- and gas-fired power plants, continued and expanded conservation efforts, and increased interruptible power-purchases.

Increased generation from existing oil- and gas-fired units would increase the utilities' oil dependence, contrary to national energy policy; increase fuel costs and customer rates; deteriorate existing air-quality in the Yuma and San Diego areas; and still fail to compensate fully for the anticipated shortfall in electrical energy. Potential energy savings from existing and planned conservation programs have already been incorporated in the utilities' demand forecasts, and even if projected energy savings could be doubled, they would be insufficient to significantly offset the anticipated shortfall in the supply of electricity. Future amounts of interruptible transmission capacity are expected to be substantially less than the limited quantities currently available, and could not be relied upon for systems planning.

Other disadvantages or adverse effects that would result from the energy shortfall, even if the above mitigating measures were implemented, include possible interruptible service, rolling blackouts and brownouts and a moratorium on new hook-ups in the Yuma and San Diego service territories of the utilities, with consequent adverse effects on the incomes, health, safety and general convenience of all classes of customers. Further, the utilities could not take advantage of potential geothermal developments in the Imperial Valley and Mexico, or of coal-fired energy and the economy energy market to the east, all of which would require new transmission capacity.

ENERGY CONSERVATION AND LOAD MANAGEMENT

Energy conservation and load management have the advantage of reducing energy consumption and peak demand with no documented adverse

environmental impacts, although there are economic and other constraints that prevent or inhibit implementation of some conservation and load-management programs. Both APS and SDG&E have comprehensive on-going programs in conservation and load management that have reduced energy consumption and system peak demand compared to earlier forecasts. Current demand forecasts for the utilities incorporate anticipated energy savings and reductions in peak demand from conservation and load-management programs.

ALTERNATIVE GENERATION SOURCES

Although a principal objective of the utilities is to reduce oil and gas dependence, all types of potential generating capabilities were considered, including the addition of new oil- and/or gas-fired units, repowering of existing units, the addition of coal or nuclear plants, development of hydroelectric facilities, development of geothermal power, cogeneration, purchases from Mexico, wind turbines, solar energy, biomass and new technologies. Neither APS nor SDG&E found these alternatives reasonable because of constraints of capital costs, national energy policy, environmental regulations, state-of-the-art technologies or lead-time required to construct new generating facilities in relation to time-of-need. In the case of APS, no additional generating capability could be justified by the company's long-range forecast until 1990. Most of the alternative generation sources considered by SDG&E would be located off-system and would require new transmission facilities to deliver energy from each of the alternative generation sources to the SDG&E service area.

In addition to considering individual generation alternatives, APS and SDG&E also considered the cumulative effects of some of the alternatives in combination that passed an initial screening based on criteria that they reduce oil/gas requirements and meet the time limit of the stated need. A potential range of capacity for eight alternatives -- additional conservation, hydroelectric and geothermal development, purchases from Mexico, cogeneration, wind, solar and biomass development -- was then compared to realistic estimates. The results indicated that if total maximum potential capacity were fully realized, SDG&E's projected capacity-needs would be met through 1988. However, because the values used to quantify the range of potential capacity and realistic estimates were conjectural, and the availability of maximum capacity from all eight alternatives uncertain, it was concluded that the cumulative effects of the alternatives in combination could not be considered to meet the stated need. APS reached a similar conclusion by demonstrating that none of the alternatives was independently viable and their effects in combination would not meet the stated need.

ALTERNATIVE TRANSMISSION SYSTEMS AND TECHNOLOGIES

Another alternative considered for meeting the stated need was the transfer of energy from generation sources outside San Diego and Yuma using existing or

new transmission systems and/or technologies. And, since a principal concern of both utilities is to obtain reliable base-load energy that is not oil- or gas-fired, the Applicants considered ways to transfer energy from existing coal-fired power plants that have surplus capacity.

The major sources of available coal-fired electrical energy within a practical range of the utilities' service areas are located in northern and eastern Arizona and in New Mexico. Therefore, the utilities concentrated on examining transmission alternatives, including existing transmission capability, between coal-fired power sources to the east and Yuma/San Diego. It was determined that sufficient transmission capability will exist in the 1980s for delivery of SDG&E's firm bulk-power purchases from coal-fired plants to Palo Verde Nuclear Generating Station (PVNGS), west of Phoenix. Accordingly, the transmission alternatives under consideration involve capability between PVNGS and San Diego.

There are at present no existing or planned transmission facilities that directly connect PVNGS with the SDG&E service area. Lines indirectly connecting the two areas are either fully utilized or fully committed to future planned requirements.

Transmission lines of voltage levels other than 500kV were considered and found to be unsuitable. A 765kV (2000 MW capacity) transmission line would have excess capacity, and two 345kV transmission lines would be required to provide the 1000 MW capacity of a single 500kV line. A direct current (dc) power transmission-system was also considered, but found not to be economically competitive for route-distances less than 400 miles. Underground transmission-systems were evaluated as alternatives, but eliminated because of technical complications, economic and environmental costs, and accessibility, although some adverse visual and aesthetic impacts would be avoided.

Investigation of the alternatives described above led APS and SDG&E to the conclusion that the optimal means for supplying power to their respective service territories within the time-frame of the stated need (given the economic, environmental, national energy-policy and state-of-the-art constraints of alternative actions) would be by constructing an overhead alternating current (ac) transmission-system between the APS main system and its Yuma service territory and a bulk-power delivery center near San Diego. (The utilities' action to explore a transmission line to the east is also consistent with a CPUC order of May 1978 that "SDG&E shall continue to analyze and pursue the concept of building a transmission-line system to the Arizona border and apply to the appropriate agencies for permits.")

THE PROPOSED ACTION

Primary facilities of the proposed Project include a single-circuit 500kV transmission line (approximately 280 miles long) from PVNGS, 40 miles west of Phoenix, Arizona, to Miguel Substation, approximately 10 miles southeast of

San Diego, California, and a double-circuit 230kV transmission line from Miguel Substation to Mission Tap, 24 miles northwest of Miguel Substation. Ancillary facilities include intermediate substations at Yuma, Arizona and the Imperial Valley, California; a 161kV transmission line to interconnect the 500kV transmission line with the local power network in Imperial Valley; a 69kV transmission system to interconnect the 500kV transmission line with the local power network in the Yuma area; and communications facilities throughout the system. A new 500kV substation would be required in the Imperial Valley and possibly in the Yuma area. At two of the four alternative substation-sites in the Yuma area (North Gila and Dome Valley) a new substation would have to be developed. Existing substations at PVNGS, Miguel, Los Coches and at two of the four Yuma alternative sites (Yucca and Gila) would be expanded or modified. Power-transfer-capability of the 500kV system would be nominally rated at 1000 MW, of which APS would have an 11 percent (or 110 MW) entitlement between PVNGS and Yuma. Construction would begin in January 1982 and be completed in May 1984. The life of the proposed Project is estimated to be 50 years.

SCOPING AND PROJECT-RELATED STUDIES - DES

Prior to preparation of the DES, environmental studies, including regional-scale and corridor-scale studies, were conducted for more than 1,100 miles of alternative transmission-line routes between PVNGS and Mission Tap via Miguel. The principal studies, through which the environmental baseline for impact assessment and mitigation planning was developed, inventoried existing conditions for air, geotechnical and ecological resources in the natural environment; land uses, agricultural resources and socioeconomic, visual and acoustical characteristics of the human environment; and archaeological, historical and Native American cultural resources in the cultural environment. Studies were also conducted (1) to determine the feasibility of the International Border, Salton Sea and Banning Pass alternative corridors, proposed in public scoping meetings; (2) to assess the potential environmental impacts of ancillary facilities; (3) to determine potential growth-inducing effects; and (4) to analyze potential electrical, biological, health and safety effects from the proposed Project.

In compliance with NEPA, appropriate Federal, state and local agencies, and interested persons participated in the identification of significant issues relevant to the proposed Project, and in the development of the work plan for environmental studies. The comprehensive scoping process included the following sequential steps:

- Review of published and unpublished pertinent data, including a number of previous environmental studies and environmental statements germane to the study area.
- Identification and development of additional data where it was deemed necessary.

- Selection of a preliminary network of alternative transmission corridors for the 500kV transmission line between PVNGS and Miguel and for the 230kV transmission line between Miguel and Mission Tap.
- Four public meetings to determine significant environmental issues to be emphasized in the environmental studies and review the preliminary corridors under consideration.
- Selection of the final network of alternative transmission corridors, and identification by the Applicants of a proposed centerline within each corridor and alternative study areas for ancillary facilities.
- Preparation of a scope of work.

An extensive program to contact and inform the public was conducted to provide information on the proposed Project to agencies, groups and individuals; to solicit input and obtain data for the environmental studies; and to identify issues and concerns about the proposed Project early in the planning process. BLM, CPUC, APS, SDG&E and Wirth Associates (the environmental consultant) all participated in the program.

SCOPING AND PROJECT-RELATED STUDIES - SDES

As a result of issues, concerns and objections raised by various public agencies, special-interest groups and the general public, additional studies were conducted. The principal issues of public concern included:

- Alternative energy sources and conservation.
- Energy needs.
- Crossing agricultural lands.
- Hazards to aerial applicators.
- Visual impacts to residences.
- Loss of property values.
- Health and safety effects of 500kV transmission lines.
- Noise, radio and television interference.
- Location of 500kV transmission lines, substations and associated lower-voltage transmission lines.

It is important to note that although some of the issues and concerns voiced in hearings and letters formed the basis for additional studies - and, subsequently, this supplement to the DES - replies to individual letters and comments will appear in the final environmental document, and not in this document.

As a result, new alternatives were studied either at a Phase II level (corridor scale), or for their general feasibility/suitability to see if they warranted Phase II studies. Alternatives studied for the SDES are briefly described below.

Yuma - Alternative 500kV transmission routes, 500kV/69kV substation sites and associated 69kV transmission systems were studied at a Phase II level in the Yuma area.

Sand Hills - One alternative 500kV transmission route crossing the southern portion of the Sand Hills was studied at a Phase II level in addition to a feasibility/suitability study conducted on a route further north.

Imperial Valley - One 500kV and two 161kV transmission-line alternatives were studied at a Phase II level. Also, the Salton Sea and Banning Pass alternative routes, and 500kV/161kV substation sites previously studied for the DES were reevaluated. The Holtville Drain alignment was analyzed with respect to engineering, design and agricultural constraints. Existing data relevant to the Palo Verde-Devers transmission route, Mesquite Lake Substation, and the median strip of Interstate 8 (I-8) were reviewed.

Dulzura - Three new alternative 500kV transmission routes south of Dulzura were studied at a Phase II level, and the Otay International Border Route was studied for feasibility/suitability.

Miguel-Mission Tap - Results of previous studies on alternative transmission routes between Miguel Substation and Mission Tap were documented.

THE AFFECTED ENVIRONMENT

The environment potentially affected by the proposed action in southwestern Arizona and southern California is one of diverse natural features, land uses and cultural resources. With the exception of a few urban centers, the area is sparsely populated. The eastern portion of the study area is largely desert with characteristically hot summers, cool winters and scant precipitation, while the western portion has a climate typical of the Coastal Mountain Range, with warm summers, cool winters and moderate precipitation.

The Arizona portion of the study area falls within the Sonoran Desert section of the Basin and Range Province and is characterized by stark, rugged mountains rising abruptly from the desert floor to less than 2,000 feet elevation.

The Peninsular Range section in the Lower California Province, the westernmost portion of the study area, is characterized by major northwest-trending ridges, commonly 5,000 to 8,000 feet in elevation, bounded by steep scarps and aproned by numerous small alluvial fans extending from large drainages into adjacent valleys. The Salton Trough section of the Lower California Province, including the Imperial and Coachella valleys as well as the inland Salton Sea, extends eastward from the Peninsular Range to the edges of the Chocolate and Cargo Muchacho mountains, and is bounded on the northeast and southwest by major active faults. The Salton Trough is noted for its low relief and exceptionally low elevations (-200 feet near the Salton Sea, which provides drainage for this section of the Province), and for the Sand Hills in eastern Imperial County, which provide an exceptional example of migrating sand dunes and stationary sand deposits.

The easternmost California alternative corridors cross the Colorado Desert in the Lower California Province, a region dominated by northwest-trending eroded mountains separated by broad flat alluvium-filled valleys. The Colorado River, which is the largest water source in Imperial County, forms the eastern boundary of the Colorado Desert and the natural and political boundary between Arizona and California.

The most significant resources and land uses within the alternative transmission-line corridors include the riparian habitat along the Colorado and Gila rivers; unique vegetative communities; Federal- and state-protected plant and wildlife species; big game animals; irrigated farmlands; the Salton Sea National Wildlife Refuge; the Anza Borrego State Park (the second largest state park in the nation); the Gila Bend (Papago), Cocopah, Fort Yuma (Quechan) and Campo (Kumeyaay) Indian reservations; Luke Air Force Gunnery Range; YPG; the scenic quality of riparian and mountain landscapes; the Sand Hills; and archaeological, historical and Native American cultural resources.

ENVIRONMENTAL CONSEQUENCES

Impact Assessment/Mitigation Planning Process (IA/MPP)

Environmental consequences from the proposed action and alternatives are the residual impacts derived through a process that first identified, and subsequently evaluated and integrated, initial (unmitigated) impacts and appropriate mitigation measures. The process involved assessing impacts based upon a comparison of the proposed Project with the pre-Project environment; determining mitigation that would avoid, effectively reduce or eliminate impacts; and identifying "residual" impacts, or impacts remaining after the application of mitigation committed to by both the Applicants and BLM. The impact assessment was conducted on alternative routes and assumed a geographic tolerance of one-half mile (one-quarter mile on each side of the Applicants' preliminary centerline).

Transmission - 500kV/230kV

Significant types of impacts relevant to ecological resources include any impact that affects officially regulated or protected species, communities or areas; interferes with migration of wildlife; alters the diversity of biotic communities or population of plant or animal species; affects important habitat; or increases potential for wildfire.

In Arizona, potential significant impacts may occur to special-status plant species, e.g., elephant tree; migratory waterfowl, bighorn sheep and Sonoran pronghorn habitat, and possible habitat for Gila monster, desert tortoise and flat-tailed horned lizard. In the California study area, potential significant impacts may occur to unique plant species, Andrew's scarab beetle, bighorn sheep range, raptor nesting areas, good-quality habitat and a vernal pool.

Characteristically, direct and long-term impact types for social and economic land uses include any impact that displaces, alters or otherwise physically affects any existing development of a planned residential, commercial, industrial or institutional use or activity, utility line or facility, communications facility or related activity, air-facility or related activity; affects official general or regional plans, policies, goals or operations of communities or governmental agencies; or affects reliability of electrical service because of potential man-induced hazards.

Potential significant residual land-use impacts were identified for individual and clusters of residences scattered throughout the study corridors; a few private airstrips, some institutional and light industrial land-uses and mobile parks.

Potentially, significant residual impacts to park, preservation and recreation land uses included the Fred J. Weiler Greenbelt, BLM-off road vehicles (ORV) open areas, BLM concentrated use zones, a California State Preservation Area of Outstanding Natural Sand Dunes, the Pacific Crest Trail, the Coochama Experimental Forest and Cottonwood Golf Course.

The agricultural study identified long-term impacts to agricultural resources in terms of estimated annual costs of additional farm equipment, irrigation and weed-control operations, within and around transmission towers, additional aerial applications, and crop-loss. Short-term impacts included costs of crop-loss due to loss of cropping area, additional irrigation operations, cost of site-reconditioning, cost of perennial crop-reestablishment and loss of crop due to tree pruning. Impact types considered included any impact that affects crop production and farming operations or occupies "prime" or "unique" farmland. A moderate level of impact was applied to all agricultural land, regardless of the type of crop impacted. (See Agricultural Study, Appendix D in the DES.)

The socioeconomic impact analysis addressed potential positive and negative construction-worker, expenditure and fiscal effects that would result from the construction of the proposed facilities. The maximum demand by construction

workers for temporary accommodations could be met with existing facilities in each community and community services would be adequate. Potential indirect-tax revenues that would accrue to communities and taxing jurisdictions in the study area would be minimal, but would be a beneficial impact of the proposed Project. Increases in property-tax revenues during operation would be a significant long-term beneficial impact. Personal income in the region would rise as a result of Project expenditures, which would be a small beneficial impact for the region.

Visual impacts were considered to be adverse, direct and long-term. Typical impact-types included impacts affecting the quality of any scenic resource; any resource possessing rare or unique value; the view from or modifying the visual setting of any residential, commercial, institutional or other visually sensitive land-use; the view from a visual setting of any travel route; the view from a visual setting of any established, designated or planned recreation, preservation, educational or scientific facility, use area, activity, view point or vista.

Visual intrusion of the transmission line because of structures contrast (no similar existing structures), landform contrast (new or upgraded access roads and tower-pad construction) and vegetation contrast (vegetation removal), would continue throughout the life of the proposed Project. The greatest residual impacts would occur in areas of natural scenic quality or where the transmission line would be in close proximity to residences, travel routes (e.g., I-8, use areas (Sand Hills), or other sensitive viewing locations.

Impacts to archaeological resources, which are nonrenewable, would be adverse and permanent. Construction and operation activities could result in impact types affecting archaeological resources physically and/or visually; sites or districts included in or eligible for inclusion in the National Register of Historic Places; or sites or areas identified as having special archaeological value. Impact levels were probability levels determined by a predictive model.

Potential high impacts to archaeological resources were predicted in the Gila Bend Mountains, along the Gila River, in the Muggins and Laguna mountains, the foothills of the Gila Mountains, the Colorado River Pilot Knob area, the Picacho Basin along the ancient Lake Cahuilla shorelines, the base of the Fish Creek Mountains, in the vicinity of Jacumba, along the Jamul, Tecate and Dulzura creeks and the Sycamore Canyon drainage, and along the base of Mother Miguel Mountain.

Types of impacts to historical resources were identified as direct physical impacts resulting from construction-related activities; indirect physical impacts resulting from increased access; and visual impacts created by the presence of towers and lines during the life of the proposed Project.

No potential significant impacts to historical resources are expected in Arizona. In California, significant impacts were identified for Pilot Knob Historic Native American site, the Plank Road Area of Critical Environmental Concern, Southern Emigrant (Butterfield) Road and the Jamul Cement Works.

Three types of impacts to Native American cultural resources were assessed: physical, visual and aural. No specific identification of Native American cultural resources will be disclosed in this document because of Native American concern for the sacred nature of many sites and the desire to protect the resources. Potential significant impacts would occur to multiple-resource areas, rock art areas, cremation/burial areas, village sites and sacred mountains.

No significant potential impacts to air and geotechnical resources or acoustical characteristics were identified.

Ancillary Facilities

The construction and operation of the Imperial Valley Substation sites could highly impact archaeological resources. A high probability for encountering sites was indicated by the predictive model. (Subsequently, an intensive survey in July 1980 revealed no sites at Substation Site D.) The expansion of facilities at Miguel Substation would potentially affect ecological and archaeological resources significantly. The expansion of facilities at Los Coches would occur near Lake Jennings Park, a highly sensitive land-use. Depending on the final location of the Yucca Substation, a high impact to a single dwelling could occur. No significant potential environmental impacts were identified for the North Gila Substation site; however, significant impacts at the Yucca Substation site would occur to Native American and agricultural resources. (The 50 acres of agricultural land that would be removed from production represents the most significant impact (high impact) to agricultural resources from the proposed Project.) Significant (moderate) potential impacts at the North Gila Substation site were identified for historical and visual resources, while at the Dome Valley Substation site there would be a potential significant (moderate) impact to ecological resources.

Construction and operation of the 69kV transmission system would result in significant (moderate) potential impacts to ecological resources along routes that cross riparian areas and known flat-tailed horned lizard habitat. A high impact could also result where the 69kV transmission line would cross the N.R. Adair County Park. A moderate impact to visual, historic and Native American cultural resources could also occur along sections of the 69kV alternative routes.

Significant (high) potential impacts to ecological resources could occur from the construction and operation of the 161kV transmission line because of an important waterfowl rookery and potential waterfowl collision hazard. Significant (high) potential impacts also exist for archaeological resources along 161kV alternative routes because of projected high density of sites.

Potential high impacts from the construction of microwave towers could occur to Native American cultural resources at one site.

ELECTRICAL, BIOLOGICAL, HEALTH AND SAFETY EFFECTS

Only the potential impacts from the 500kV line were analyzed, as any electrical effects experienced by the public, with the exception of audible noise, would be less adjacent to substation and communications facilities and beneath lower-voltage lines.

The electrical effects considered in the studies were those resulting from corona and electric fields. Corona, which is the discharge of energy from an energized line when the voltage gradient exceeds the breakdown strength of air, is greatest during wet weather. Effects of corona are audible noise, visible light, photochemical oxidants, and radio and television interference. No significant adverse effects from audible noise, visible light and photochemical oxidants are anticipated. Radio and television interference would be most pronounced in areas of weak reception and where antennae are located close to a transmission line.

Effects from electrostatic and magnetic fields that develop around a transmission line are of general concern because of the potential for induced voltage onto conductive objects within the electrostatic field, instantaneous ignition of fuel, electric shock to human beings and possible health and biological hazards.

Short-circuit current from induced voltage would be limited by the proposed Project's line design in compliance with national and state safety codes, and the electrostatic potential would be eliminated for all permanent structures by grounding within 200 feet of the right-of-way. Line design will limit to 5.0 milliamps (mA) the short-circuit current from metallic objects. Studies have shown that let-go thresholds for people are equal to or greater than 5.0 mA.

Interference that might result from induced voltage from a magnetic field to pipelines, rails, overhead communications circuits or other electric lines would be mitigated by the Applicants to the satisfaction of affected utilities and individuals.

The results of studies, reported to date, on biological and health effects from electric fields are inconclusive in establishing that such effects do occur. On the other hand, it has not been clearly demonstrated that such effects do not occur. If they do, in fact, occur, experts are not in agreement that they pose a potential biological or health hazard. Reversion of pacemakers is the most substantial effect noted to wearers of pacemakers and is not considered a serious problem. To date, no evidence that a transmission line has caused a serious problem to the wearer of a pacemaker has been found.

GROWTH INDUCEMENT

A growth-inducing impact study was conducted to estimate potential economic and demographic impacts to the SDG&E service area from the proposed Project. A baseline "no-project" alternative was hypothesized using criteria established by CPUC.

The proposed Project was considered to be growth-accommodating rather than growth-inducing, with any growth differential between the Project and no-Project alternatives not attributable solely to the Project.

Results of the study indicated that potential growth-inducing impacts would not be significant.

ENVIRONMENTALLY PREFERRED ROUTE

For the SDES the environmentally preferred route was identified for five geographic areas. It is important to note that two environmentally preferred routes were chosen in the Yuma area. Each route reflects a different set of values, or point of view, in trade-offs between resources. The southern preferred alternative represents the route with the least cumulative environmental consequences. The northern preferred alternative responds to public concerns expressed and gives greater significance to land-use conflicts and agricultural impacts. The following presents the SDES environmentally preferred route(s):

Yuma -

South: Set XIV Route 2 (Links 36, 37, 38, 43, 56, 59, 60, 62, 63, 65, 67, 68, 70, 124a, 124b, 125)

*North: Set XIV Route 6 (Links 36, 37, 40a, 40b, 41, 48, 49, 51, 101, 108, 110a, 165, 162, 163, 164, 134)

*Sand Hills - Set XV Route 1 (Link 126A)

Imperial Valley - Set IX(R) Route 1 (Links 129, 133, 138)

*Dulzura - Set XI(R) Route 3 (Links 145a, 155, 157, 159, 146b)

Miguel-Mission Tap - Connector N (Link 151)

The complete DES environmentally preferred route and the complete SDES environmentally preferred route (with southern and northern routing options at Yuma) are shown in Table 3-8d and Figure 3-15(R).

*Varies from Environmentally Preferred Route in DES.

Description of the Environmentally Preferred Route

PVNGS to Yuma

While the environmental consequences along the Arizona portion of the proposed preferred route can generally be characterized as moderate-to-low, there remain some significant unavoidable adverse impacts. The preferred route would traverse areas of moderate-to-high natural scenic-quality and be visible (in close proximity) from residences and portions of I-8. Visual impacts would result from structures contrast (no existing structures similar to that of the proposed Project) and landform contrasts. The preferred route would pass through special-status plant habitats (11.0 miles) and the habitat of the Gila monster. Of the approximately 8.5 miles of agricultural land crossed, approximately 3.6 acres would be eliminated from productive use. One airstrip would be traversed, and four single-family dwellings could be highly impacted. Cultural-resource sites important to Native Americans would be affected by this route and previously recorded archaeological sites may be crossed.

Yuma

Arizona Southern - While the environmental consequences along the southern portion of the proposed preferred route can generally be characterized as moderate-to-high, there remain some significant unavoidable adverse impacts. The preferred route would be visible (in close proximity) from residences. Visual impacts would result from structures contrast (no existing structures similar to that of the proposed Project). The preferred route would pass through habitat of the flat-tailed horned lizard. Of the approximately 17.8 miles of agricultural land crossed, approximately 7.1 acres would be eliminated from productive use. Two housing subdivisions and one airstrip would be traversed, and 22 single-family dwellings could be highly impacted. Cultural-resource sites important to Native Americans would be affected by this route.

Arizona Northern - While the environmental consequences along the northern portion of the proposed preferred route can generally be characterized as moderate-to-high, there remain some significant unavoidable adverse impacts. The preferred route would traverse areas of moderate-to-high natural scenic quality and be visible (in close proximity) from residences. Visual impacts would result from structures contrast (no existing structures similar to that of the proposed Project) and landform contrasts. The preferred route would cross the Colorado River (potential bird collision hazard). Of the approximately 2.0 miles of agricultural land crossed, approximately 1.0 acre would be eliminated from productive use. Cultural-resource sites important to Native Americans would be affected by this route.

California Southern - The southern portion of the environmentally preferred route can generally be characterized as having moderate-to-high environmental consequences with several significant unavoidable adverse impacts.

The route would traverse areas of moderate-to-high natural scenic-quality. Visual impacts resulting from structures contrast and landform contrast are predicted for this route. The preferred route would pass through 0.2 mile of Colorado River habitat and cross one area of park, preservation or recreation land-use. The route would also traverse an area of archaeological, historical and Native American concern designated as an ACEC by the BLM.

California Northern - The northern portion of the environmentally preferred route can generally be characterized as having moderate-to-high environmental consequences with several significant unavoidable adverse impacts. The route would traverse areas of moderate-to-high natural scenic-quality. Visual impacts resulting from structures contrast and landform contrast are predicted for the route. The preferred route would pass through 0.2 mile of Colorado River habitat and cross several areas of park, preservation or recreation land-use. The route would also traverse areas of archaeological concern designated by BLM as having "very high" sensitivity. Numerous cultural-resource sites of Native American concern would be potentially affected.

Sand Hills-Mission Tap

The California portion of the environmentally preferred route can generally be characterized as having moderate environmental consequences with several significant unavoidable adverse impacts. The route would traverse areas of moderate-to-high natural scenic-quality and be visible from residences. Visual impacts resulting from structure contrast and landform contrast are predicted for a major portion of the route. The preferred route would pass through 79.6 miles of special-status plant habitat and traverse raptor nesting areas and the habitats of the Andrew's scarab beetle, flat-tailed horned lizard, bighorn sheep and magic gecko. Of approximately 22.4 miles of agricultural land crossed, approximately 10.1 acres would be excluded from productive use. The preferred route crosses several areas of park, preservation or recreation land-use; one single-family dwelling and one mobile home would be highly impacted. The route would also traverse areas of archaeological concern designated by BLM as having "very high" sensitivity and "severe density" of sites. One historical site and numerous cultural-resource sites of Native American concern would be potentially affected.

BLM PREFERRED ROUTE

BLM's preferred route on public lands is the northern environmentally preferred route. (See Figure 3-15(R).)

APPLICANTS PREFERRED ROUTE

The Applicants' preferred route is the northern environmentally preferred alternative, with two exceptions. Both exceptions are located in the Muggins Mountains/Dome area in Arizona. The first exception substitutes Link 28 for Links 29, 30a and 30b. The second exception substitutes Links 86, 76 and 74b for Links 36, 37 and 40a.

In both instances, the Applicants' deviations from the northern environmentally preferred route were selected because the utilities believe they represent a more reasonable balance between the human and natural environments.

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*(R) indicates revision of a table in the DES.

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PURPOSE & NEED FOR ACTION

CHAPTER I - PURPOSE AND NEED FOR ACTION

N.B. This chapter replaces Chapter I in the DES.

INTRODUCTION

Arizona Public Service Company (APS) and San Diego Gas and Electric (SDG&E) (the Applicants or utilities) propose to construct, operate and maintain a transmission system connecting the electric power networks of APS, SDG&E and the Imperial Irrigation District (IID). (Routing alternatives and ancillary-facility sites are illustrated in Figure I-1(R)*.) Primary facilities of the proposed Project include a 500kV transmission line from Palo Verde Nuclear Generating Station (PVNGS) Switchyard, 40 miles west of Phoenix, Arizona, to Miguel Substation, approximately ten miles southeast of San Diego, California, and a double-circuit 230kV transmission line from Miguel Substation to Mission Tap, via Los Coches Substation, 24 miles northwest of Miguel Substation. Ancillary facilities include intermediate substations near Yuma, Arizona and the Imperial Valley, California; a 161kV transmission line to interconnect the 500kV transmission line with the local power network in Imperial Valley; a 69kV transmission system to interconnect the 500kV transmission line with the local power network in the Yuma area; and communication facilities throughout the system. Power-transfer-capability of the 500kV system would be nominally rated at 1000 MW, of which APS would have an 11 percent (or 110 MW) entitlement, annually, between PVNGS and Yuma.

NEED

Electric utilities have a responsibility to provide adequate supplies of reliable and economical electricity to all classes of customers. Arizona Public Service forecasts show a need for additional electric-power supplies in the Yuma area (Lower Colorado River Area) by 1986, which could be met with existing generating capacity within the APS main system, provided additional transmission capacity to Yuma is constructed. San Diego Gas & Electric forecasts indicate that current generating capacity supplemented by firm power-purchases is adequate until 1988 (assuming the start-up on schedule of San Onofre Nuclear Generating Station Units 2 and 3), but that either additional transmission or generating capacity will be needed thereafter.

However, the inordinate dependency of both utilities on oil and natural gas as primary fuel-sources brings into question the reliability and economics of continuing to rely on oil and natural gas for providing base-load electricity to their respective service territories.

* (R) indicates revision of a table or figure in the DES.

The uncertain availability in the near and distant future of both foreign and domestic oil and natural gas supplies amplifies the need for obtaining a more diversified fuel mix. There is also an increasing need for regional utilities to work cooperatively to maintain greater flexibility and enhanced reliability through interconnections. At the same time, SDG&E must strengthen its system by developing independent transmission paths to take advantage of sources of electricity outside its own system.

Electric rates charged by SDG&E to its customers are among the highest in the Nation. The company must act to decrease its use of expensive fuel oil and fully utilize economy energy markets, in order to avoid burning oil whenever possible, while minimizing capital investments in the near term (because of the company's bond rating and high-level capital investment).

PURPOSE

The proposed Project would serve the following purposes: help reduce dependence on oil and natural gas for generating electricity consumed in the APS Lower Colorado River and SDG&E service territories; furnish access to the economy energy market; enhance system reliability; and help meet the forecast need for power of both utilities by providing long-term, firm transmission capacity.

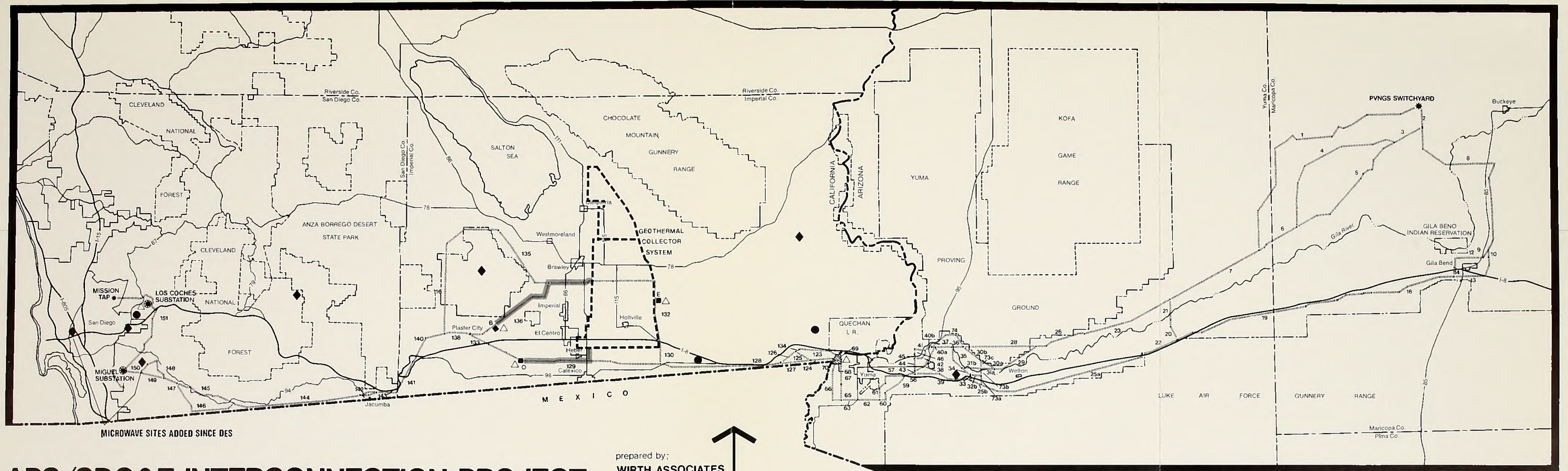
REDUCE DEPENDENCE ON OIL AND GAS CONSUMPTION FOR GENERATING ELECTRICITY

The Powerplant and Industrial Fuel Use Act (PIFUA) of 1978 discourages the use of fuel oil and gas for generating electricity. In 1979, SDG&E generated 57.5 percent of its energy from oil and 24.1 percent from gas. The proposed Project would, therefore, be in accord with PIFUA by providing access to coal-based energy in Arizona and New Mexico, and potential geothermal energy in California and Mexico. From 1984 through 1998, the proposed Project could deliver non-oil/gas-fired energy equivalent to approximately 70 million barrels of fuel oil.

The proposed Project would also provide APS access to lower-cost, non-oil-fired power to displace energy currently generated in the Yuma area by oil-fired combustion-turbine power during periods of high demand. The Project could, accordingly, be expected to reduce APS oil consumption in the Yuma area by an equivalent 185,000 barrels during 1985 and 1986.

FURNISH ACCESS TO THE ECONOMY ENERGY MARKET

The proposed Project would provide SDG&E transmission capability for obtaining lower-cost power available during off-peak periods in Arizona and New Mexico.



APS/SDG&E INTERCONNECTION PROJECT

STUDY AREA

500/230kV Transmission Lines

66 Link and Number

Substations

Alternative Imperial Valley Substation Sites

Expanded (Los Coches, Miguel)

Alternative Yuma Substations

Microwave Communication System

Associated with Substations

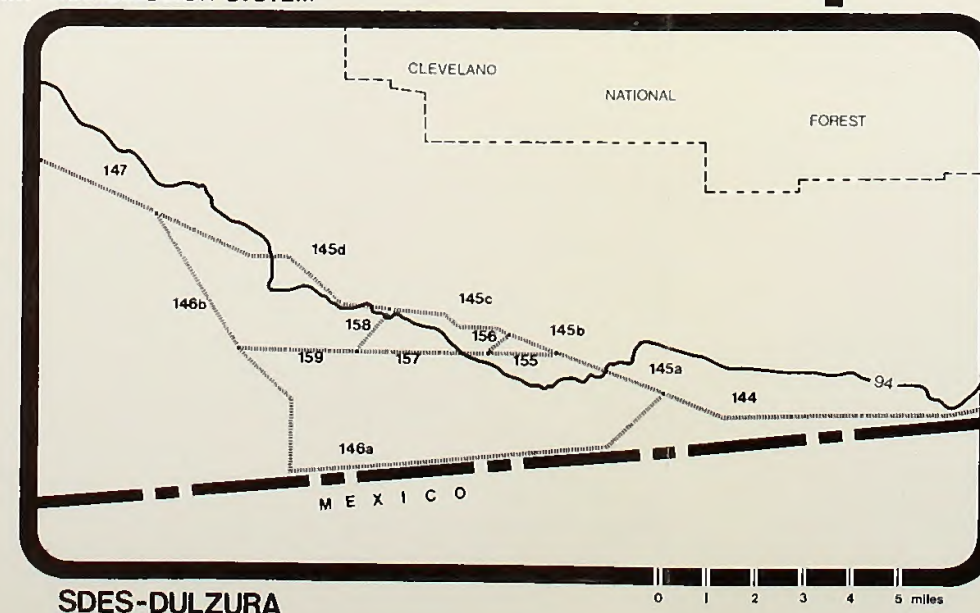
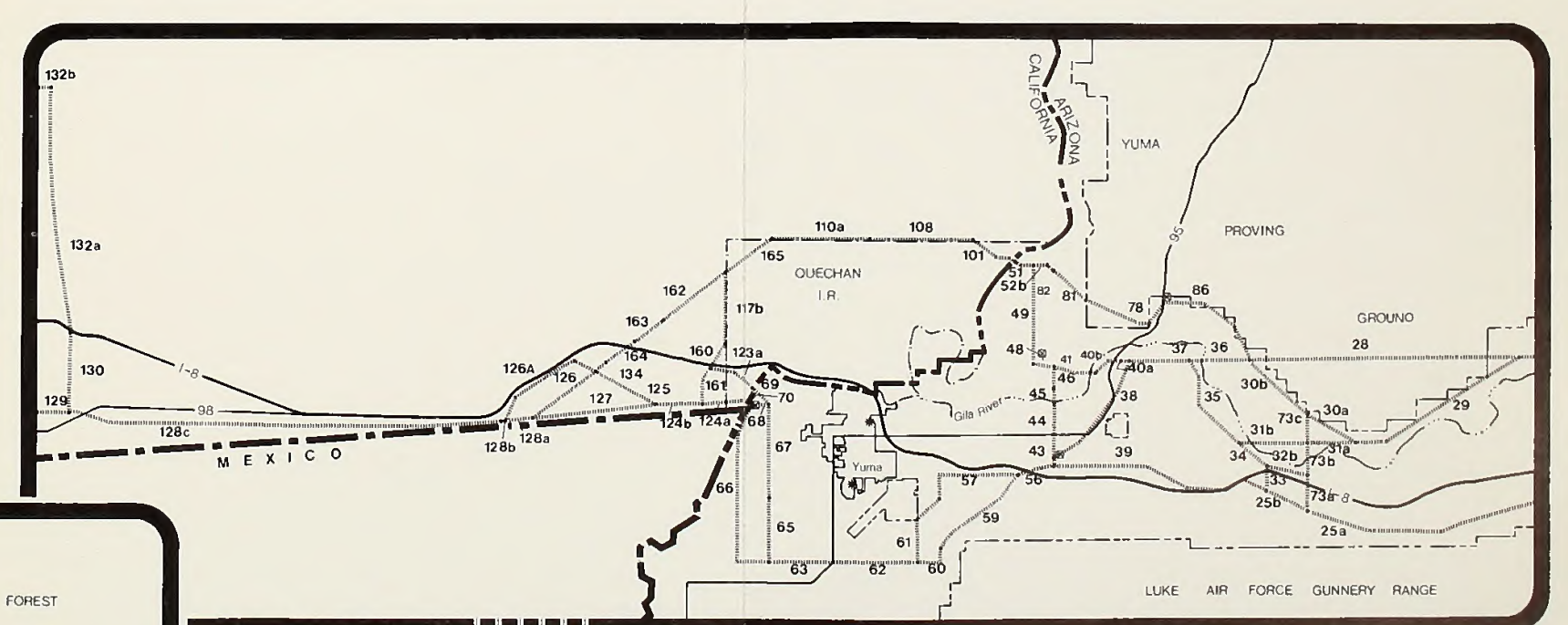
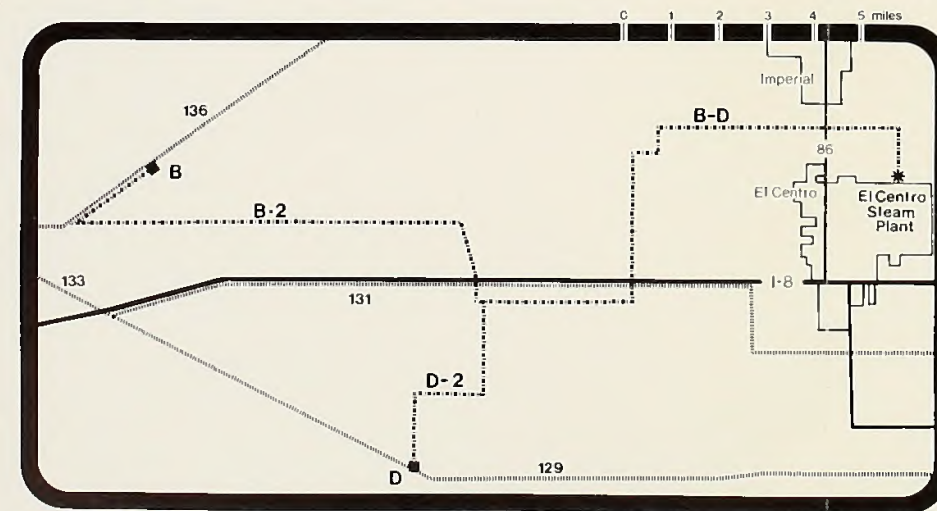
Associated with Existing Facilities

New Sites

69kV/161kV Transmission Lines

Typical Alternative 161kV Transmission Corridor

Typical Alternative 69kV Transmission Corridor



SDS-YUMA

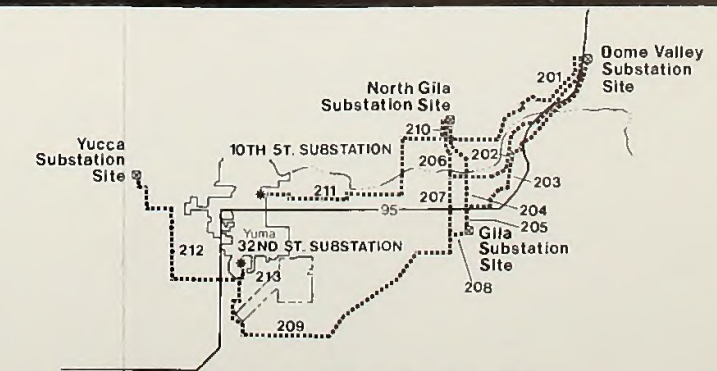


Figure 1-1(R)

ENHANCE SYSTEM RELIABILITY

The proposed electric link between APS, SDG&E and IID systems would permit capacity and energy exchanges during operating emergencies, and would improve the efficiency and economy of all three systems. Primary fuel sources would be diversified so that impacts resulting from the interruption of any one type of fuel supply would be minimized. Voltage regulation, frequency control, stability margins and opportunity for reserve sharing would further be improved, thus enhancing system reliability for APS, SDG&E and IID.

HELP MEET THE FORECAST NEED FOR POWER BY PROVIDING LONG-TERM, FIRM TRANSMISSION CAPACITY

The proposed Project would provide SDG&E with transmission capacity to import contracted power (up to 736 MW) from sources in Arizona and New Mexico to help meet its forecast need. Firm capacity over existing or planned transmission lines from PVNGS to San Diego is limited to only 205 MW between 1982 and 1986, and no firm transmission capacity is available beyond 1986. Although limited quantities of interruptible transmission capacity are currently available between sources in Arizona and New Mexico, and the SDG&E system, this type of capacity is not reliable for planning resource additions to meet forecast needs. Interruptible transmission capacity that may become available is expected to be substantially less than the amount of contracted and other potential firm power.

The proposed Project would also provide APS with the transmission capacity to meet forecast load demand in the Yuma area and an avenue for delivery of more economical sources of power available in the APS main system. The transmission capacity afforded by the proposed Project would, in short, allow APS to meet load growth in the Yuma area, at least through the next decade.

San Diego Gas & Electric

SDG&E's need for additional power and the ability to transmit it in the late 1980s and beyond is shown in Figure I-2(R) and more fully documented in Exhibit C of California Public Utilities Commission (CPUC) Application No. 59575. The peak demand forecast is based on the common forecasting methodology (CFM III) of the California Energy Commission (CEC), and accounts for state-mandated and utility-sponsored conservation and load-management programs and standards. To maintain adequate system reliability, it is common practice in the utility industry to plan for a reserve margin above peak demand between 15-25 percent. SDG&E's system reliability criteria provide for a 20 percent reserve margin, which was adopted by CEC. By comparison, CEC has adopted a 30 percent reserve margin for Los Angeles Department of Water and Power, and 16 percent for Southern California Edison. As shown in Figure I-2(R), SDG&E would fall below a 20 percent reserve margin after 1988 without the proposed Project.

The CEC's staff report "Biennial Report III" (BR III) confirms the finding that supplemental power will be needed to meet SDG&E's steadily increasing demand and estimates that by the year 2000 an additional 1204 MW will be required. Figure I-2(R) is a graph of the CEC-adopted demand forecast shown below.

<u>Year</u>	<u>Demand Forecast</u> (MW)	<u>20% Reserve Margin</u> (MW)	<u>Total</u> (MW)
1979	2019	404	2423
1985	2184	437	2621
1992	2686	537	3223
2000	3223	645	3868

Source: Table 5-5, CEC BR III, January 1981.

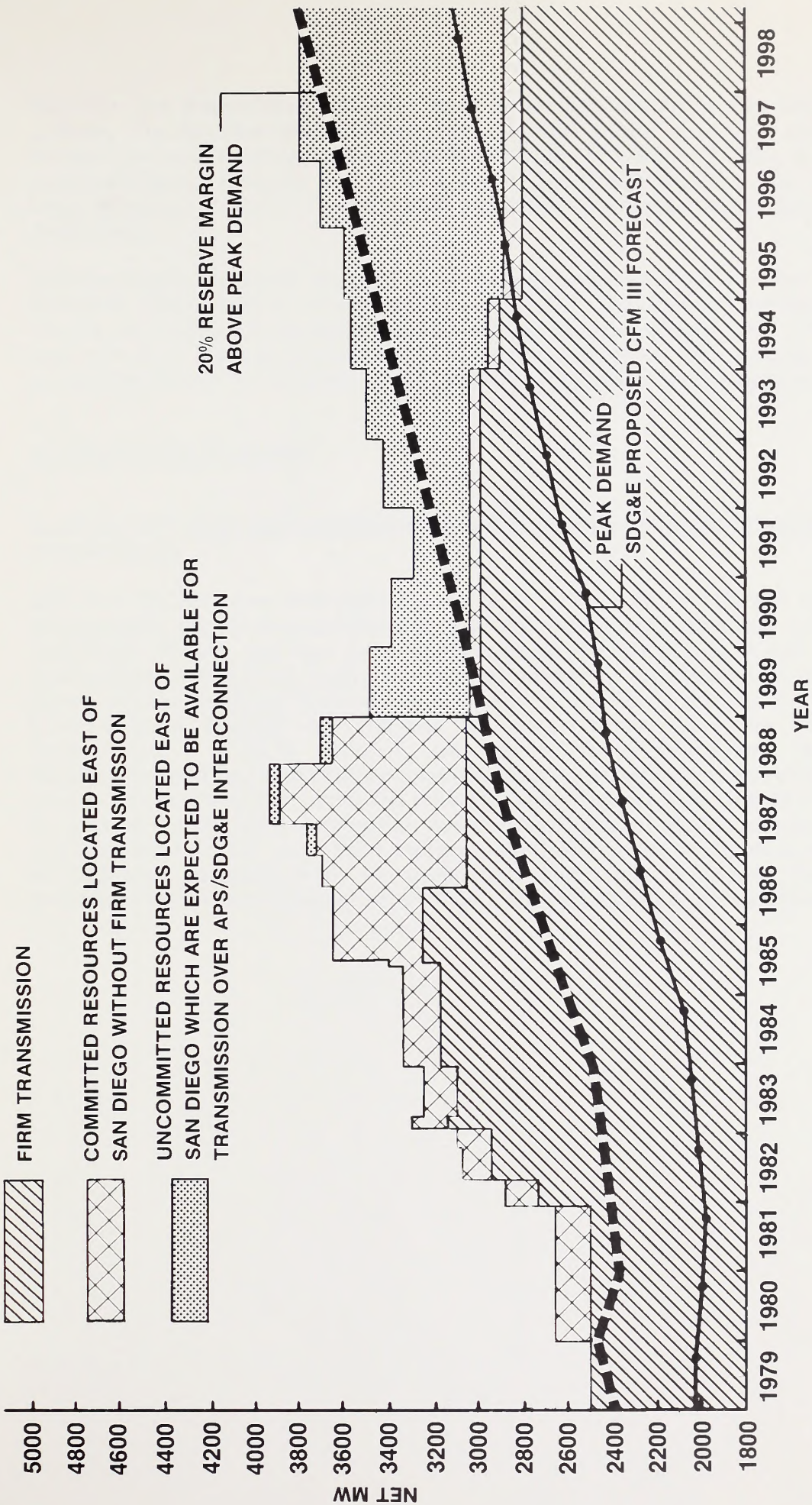
The CEC BR III forecast estimates SDG&E's average annual demand growth-rate between 1979 and 2000 to be 2.25 percent, which is higher than the average annual growth-rate of 1.65 percent for all electric utilities in California. Factors identified as contributing to SDG&E's higher growth-rate include the steady expansion of residential air-conditioning, a very high growth-rate in economic activity and population, and substantial increases in commercial-building loads.

SDG&E's 20-year resource plan relies heavily on purchases of power from other utilities in the 1980s, supplemented by gradual development of geothermal resources in the Imperial Valley in the late 1980s and throughout the 1990s, and participation in joint-ownership coal-fired power plants in the 1990s. The plan's additional resources require additional transmission capacity. SDG&E presently has contracts for firm power and associated energy from New Mexico and Arizona utilities, deliverable at PVNGS through 1988. There is, however, insufficient firm transmission capacity available to SDG&E to transmit the power purchases, which has resulted in a firm transmission deficit, as illustrated in Figure I-2(R), ranging from 100 MW, currently, to 736 MW in 1987.

In order to satisfy SDG&E's need for transmission capacity to transfer firm power-purchases, the transmission system should be able to transfer approximately 736 MW between its terminals. The lowest standard voltage for which a single transmission line is capable of transferring that amount of power is 500kV, normally rated at 1000 MW, which was a determining factor in the choice of voltage for the transmission line between PVNGS and Miguel Substation.

Arizona Public Service

Load demand for the Yuma area (also referred to as the Lower Colorado River Area) is currently met by a combination of local gas-turbine generating



SOURCE: SDG&E, DEC., 1980

SAN DIEGO GAS & ELECTRIC RESOURCE AND PEAK DEMANDS
 EXISTING RESOURCES AND COMMITTED RESOURCES WITH FIRM TRANSMISSION

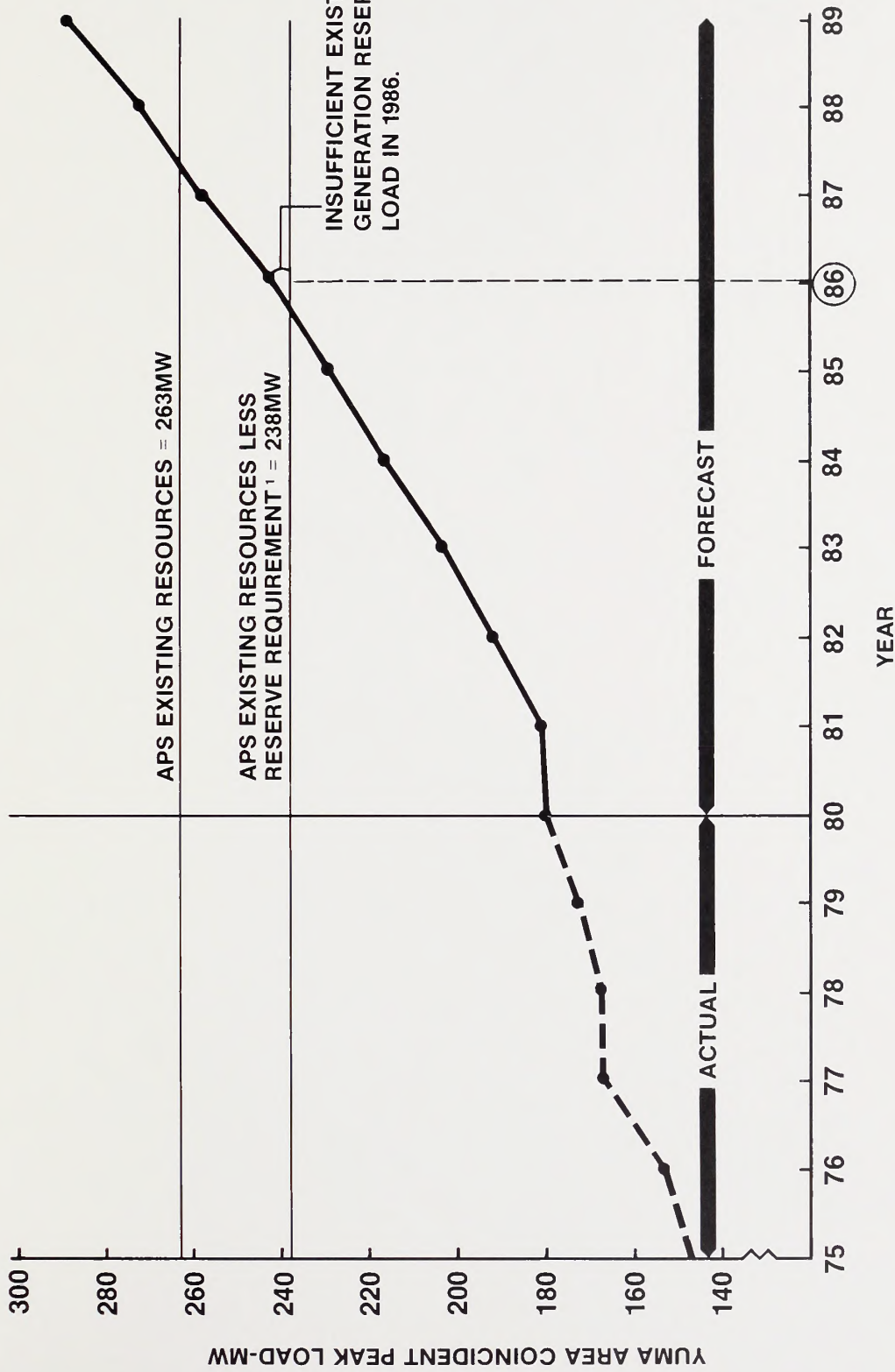
capacity and transmission capacity from other load centers in the APS main system. The forecast load for the Lower Colorado River Area will, however, exceed available local generating and transmission resources by 1986, at which time additional resources will be required. (See Figure I-3(R). The 25 MW reserve margin shown in Figure I-3(R) represents the largest generator in the Yuma area.

Arizona Public Service's ten-year load and resources forecast for the Lower Colorado River Area is shown in Figure I-3(R). The forecast reflects the impact of continued population expansion and economic activity. Although load growth in the area averaged 4 percent per year from 1975 through 1980, an average annual growth-rate of 5.4 percent is projected for the next decade.

AUTHORIZING ACTIONS

BUREAU OF LAND MANAGEMENT AND CALIFORNIA PUBLIC UTILITIES COMMISSION

APS and SDG&E have filed right-of-way applications with the Bureau of Land Management (BLM) to accommodate a 500kV transmission line and ancillary facilities. SDG&E has also made application to the CPUC. BLM and CPUC have prepared this joint environmental document and supplement in compliance with the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) for consideration with the utilities' applications. If BLM approves and grants the right-of-way, detailed negotiations will be conducted between BLM and the Applicants to review and modify as necessary the centerline location within the corridor on public lands. In considering SDG&E's application for a Certificate of Public Convenience and Necessity, CPUC must fully analyze potential impacts on the environment in California resulting from the proposed Project, and determine that the proposed Project is satisfactory from financial and reliability perspectives.



SOURCE: APS, 1981

¹RESERVE REQUIREMENT IS BASED UPON APS'S 33.3% SHARE OF THE YUMA AREA'S LARGEST SINGLE HAZARD, THE 75 MW YUCCA STEAM PLANT.

APS LOWER COLORADO RIVER AREA **RESOURCES, GENERATION RESERVE REQUIREMENTS AND LOAD FORECAST**

JURISDICTIONS WITH AUTHORIZING ACTIONS

<u>Federal Agencies</u>	<u>Authorizing Action</u>
Army Corps of Engineers	Grants river-crossing permits
Bureau of Indian Affairs	Issues permits to cross Indian land
Federal Aviation Administration	Makes obstruction evaluations of Notices of Proposed Construction or Alteration
Federal Communications Commission	Grants licenses to operate microwave and communications systems
Federal Energy Regulatory Commission	Regulates the interconnection of electric transmission facilities
<u>Arizona State and Local Agencies</u>	
Arizona Corporation Commission	Approves/disapproves certificates of environmental compatibility issued by the APPTLSC
Arizona Department of Health Services	Issues dust-control permits
Arizona Department of Transportation	Grants encroachment permits for crossing state highways
Arizona Power Plant and Transmission Line Siting Committee (APPTLSC)	Issues certificates of environmental compatibility
Arizona State Land Department	Grants rights-of-way across state lands
Maricopa and Yuma Counties	Issue franchises to use county rights-of-way, excepting state highways, within unincorporated areas
<u>California State and Local Agencies</u>	
California Department of Transportation (CALTRANS)	Grants encroachment permits for crossing state highways
California State Lands Commission	Grants rights-of-way across state lands
Imperial and San Diego Counties	Issue use permits within unincorporated areas

CHAPTER I

CHAPTER II

The first settlement in America was made by the English in 1607, at Jamestown, Virginia.

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CHAPTER IV

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SCOPING & PROJECT-RELATED STUDIES



CHAPTER 2 - SCOPING AND PROJECT-RELATED STUDIES

N.B. This chapter supplements Chapter 2 in the DES.

RESPONSE TO THE ENVIRONMENTALLY PREFERRED ROUTE

Both prior to and following the publication of the APS/SDG&E Interconnection Project Draft Environmental Document (EIS/EIR),* objections were raised to the environmentally preferred route (also identified by APS and SDG&E as the Applicants' preferred route) by various public agencies, special-interest groups and the general public. Specific issues and concerns were expressed for sections of the environmentally preferred route in five geographic areas: Yuma, Arizona; the Algodones Dunes in California; the Imperial Valley in California; Dulzura, California; and the Miguel-Mission Tap area in California.

Yuma - On June 3, 1980 prior to publication of the DES, APS notified special-interest groups in the Yuma area (e.g., irrigation districts and environmental groups) of the Applicants' preferred route, which corresponded to the environmentally preferred route subsequently identified by the Bureau of Land Management (BLM). The irrigation districts objected to the preferred route's crossing agricultural land, interfering with agricultural practices and impacting residential development, and responded by forming the APS/SDG&E Project Relocation Committee, at the suggestion of APS. The Relocation Committee comprised representatives of the Yuma community, the State Legislature, City of Yuma, Yuma County, the Yuma Chamber of Commerce, the Yuma Farm Bureau, aerial applicators, natural-resource conservation districts, irrigation districts and local farmers. The purpose of the Relocation Committee was to examine the feasibility of relocating the 500kV transmission line and associated substation away from agricultural land north of Yuma.

The original BLM preferred route (south of Yuma) had been designed to interconnect with the existing Yucca Substation, and to cross the Fort Yuma (Quechan) Indian Reservation south of Pilot Knob because that route coincided with the right-of-way negotiated by SDG&E with the Quechan Tribal Council. The original environmentally preferred route avoided crossing the Colorado River at Laguna Dam, Mittry Lake Wildlife Refuge (Arizona Game and Fish Wildlife Area), the Colorado River at the Imperial Dam and the Yuma Proving Ground (YPG) - consistent with the recommendations of the Fort Yuma Indian Reservation, the U.S. Fish and Wildlife Service (USFWS), the Arizona Game and Fish Department and YPG officials.

* Referred to in this document as the DES.

After being approached by the Relocation Committee, however, SDG&E reopened negotiations with the Quechan Tribal Council to consider a crossing of the Colorado River below Laguna Dam; YPG officials agreed to consider a route crossing land under their jurisdiction; USFWS and the Arizona Game and Fish Department agreed that crossings at the Laguna and Imperial dams would be acceptable, though not desirable, but that crossing Mittry Lake would still be unacceptable; and APS agreed to consider alternative substation sites and associated 69kV transmission systems to avoid removing agricultural land.

Sand Hills - Concern was expressed by the El Centro BLM Area Office about the preferred route's crossing Buttercup Valley in the Sand Hills and not following an existing utility corridor. Therefore an alternative Sand Hills crossing following an existing utility corridor was studied.

Dulzura - Following SDG&E's filing of an application for a Certificate of Public Convenience and Necessity, residents of the Dulzura region contacted the office of San Diego County Supervisor Lucille Moore to object to SDG&E's preferred route through the area. As a result, the San Diego County Board of Supervisors requested on July 30, 1980 that SDG&E consider an alternative routing in the Dulzura region.

SDG&E undertook additional review of the area in question, giving initial consideration to engineering/construction difficulties. Review of topographic maps and additional field reconnaissance revealed that, from an engineering/construction point of view, it would be preferable to locate additional alternatives south of the environmentally preferred route. Accordingly, SDG&E identified an alternative east/west alignment south of the communities of Dulzura, Engineer Springs and Barrett Junction. The alignment was then refined with consideration given to local topographic features and avoiding houses.

In late August 1980, the proposed alternative alignment was reviewed by SDG&E with Mr. D.D. Miller, Administrative Assistant to Supervisor Moore, who found the proposed alignment a suitable alternative.

PUBLIC HEARINGS AND REVIEW COMMENTS

After publication of the DES, four public hearings were held as follows:

1 October 1980	Phoenix, Arizona
2 October 1980	Yuma, Arizona
6 October 1980	El Centro, California
7 October 1980	El Cajon, California

The public review and comment period for the DES extended from 15 August 1980 to 15 October 1980. The principal issues of public concern raised during the hearings and expressed in letters during the public review period included:

- Energy needs
- Alternative energy sources and conservation
- Crossing agricultural lands
- Hazards to aerial applicators
- Visual impacts to residences
- Loss of property values
- Health and safety effects of 500kV transmission lines
- Noise, radio and television interference
- Location of 500kV transmission lines, substations and associated lower-voltage transmission lines

It is important to note that although some of the issues and concerns voiced in hearings and letters formed the basis for additional studies - and, subsequently, this supplement to the DES - replies to individual letters and comments will appear in the final environmental document, and not in this document.

Imperial Valley - Following the hearings and official comment period, it was again recommended by local interests that the 500kV transmission line in the Imperial Valley be relocated to avoid agricultural lands and practices. In addition, objections were raised to the proposed locations of the 500kV substation and 161kV transmission line in the Imperial Valley. Accordingly, the following alternatives were investigated:

- A new 500kV route crossing the Sand Hills to the north.
- A new 500kV route diagonally crossing East Mesa.
- A potential 500kV realignment in the Holtville Drain Area.
- Relocation of the 161kV transmission system.

Other alternatives previously studied and addressed in the DES were also recommended for reevaluation, including:

- Salton Sea
- Banning Pass
- International Border Route
- Palo Verde to Devers
- Median Strip of Interstate 8
- A 500/161kV Substation (Mesquite Lake)

Miguel-Mission Tap - Residents of the Miguel-Mission Tap region responded to identification of the original preferred route by asking why no alternatives to the existing transmission corridor were addressed in the DES.

PROJECT-RELATED STUDIES

The route-selection process is essentially a planning process by which routes that fail to satisfy established criteria are systematically eliminated through sequential refinement and evaluation of the data base. Once the study area is defined, final corridors are identified through studies conducted on a regional, or Phase I, scale. The preferred corridor(s) is determined through Phase II or corridor-scale studies which provide assessments of potential impacts that are used for comparing the final corridors. (See Figures 2-2(R) and 2-3(R).) Other alternatives proposed may be evaluated through feasibility/suitability studies (see Figure 2-4(R)) to determine whether they justify study at a Phase II level (see Appendix G).

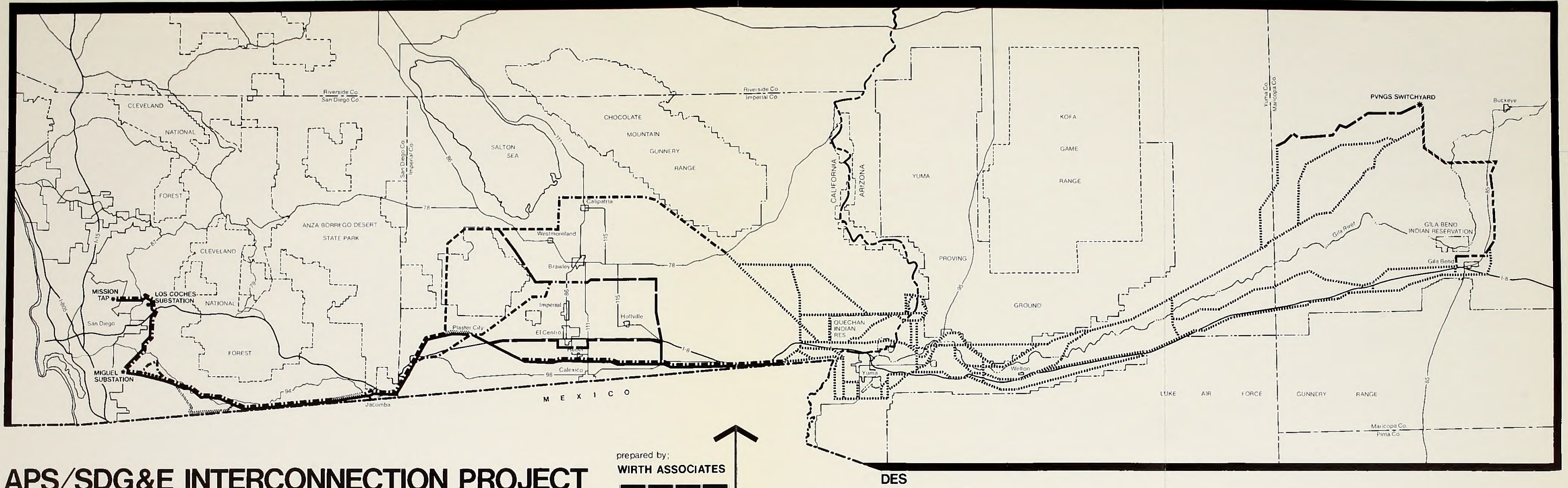
Yuma - Alternative 500kV transmission routes, 500kV/69kV substation sites and associated 69kV transmission systems (see Figure 2-5(R)) were studied at a Phase II level in the Yuma area.

Sand Hills - One alternative 500kV transmission route crossing the southern portion of the Sand Hills was studied at a Phase II level in addition to a feasibility/suitability study conducted on a route further north.

Imperial Valley - One 500kV and two 161kV transmission-line alternatives (see Figure 2-5(R)) were studied at a Phase II level. Also, the Salton Sea and Banning Pass alternative routes, and 500kV/161kV substation sites previously studied for the DES were reevaluated. The Holtville Drain alignment was analyzed with respect to engineering, design and agricultural constraints. Existing data relevant to the Palo Verde-Devers transmission route, a Mesquite Lake substation, and the median strip of Interstate 8 were reviewed.

Dulzura - Three new alternative 500kV transmission routes south of Dulzura were studied at a Phase II level, and the Otay International Border Route was studied for feasibility/suitability.

Miguel-Mission Tap - Results of previous studies on alternative transmission routes between Miguel Substation and Mission Tap were documented. Because of a change in the Project description, two proposed microwave sites (Escondido and Volcan) were replaced by the Mission Control Center and the San Miguel Mountain sites. Phase II studies were conducted at the San Miguel site.



APS/SDG&E INTERCONNECTION PROJECT

PRELIMINARY PHASE II CORRIDORS

- Sundesert Nuclear Project Transmission System Environmental Studies**
- Phase I, II and EIS
 - EIS only
 - Imperial Valley Action Plans (IVAP) Studies
 - Jamul Mountains Route Alternative Environmental Studies—Phase II
 - North Valley Route Alternative Environmental Studies—Phase II
 - Intensive Cultural Resources R.O.W. Surveys—Phase III
 - Liberty to Gila Bend Transmission Line Environmental Studies—Phase II
 - PVNGS to Kyrene Transmission Systems Environmental Study—Phase II
 - Palo Verde to Devers 500kV Transmission System Environmental Studies—EIS
 - APS/SDG&E Interconnection Project Environmental Studies Corridors Identified through Phase I Studies
 - APS/SDG&E Interconnection Project Environmental Studies Corridors Identified For Evaluation in the SDES

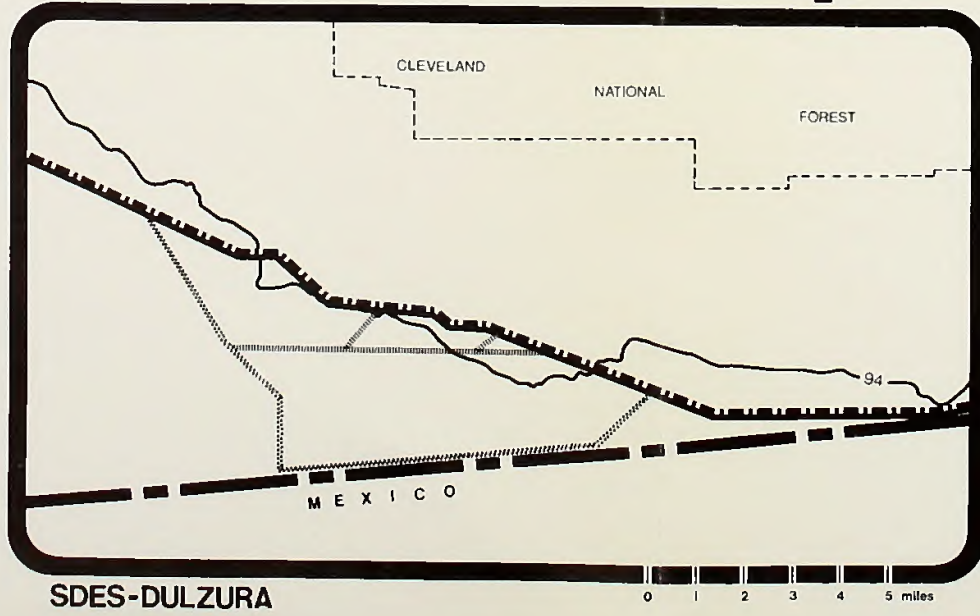
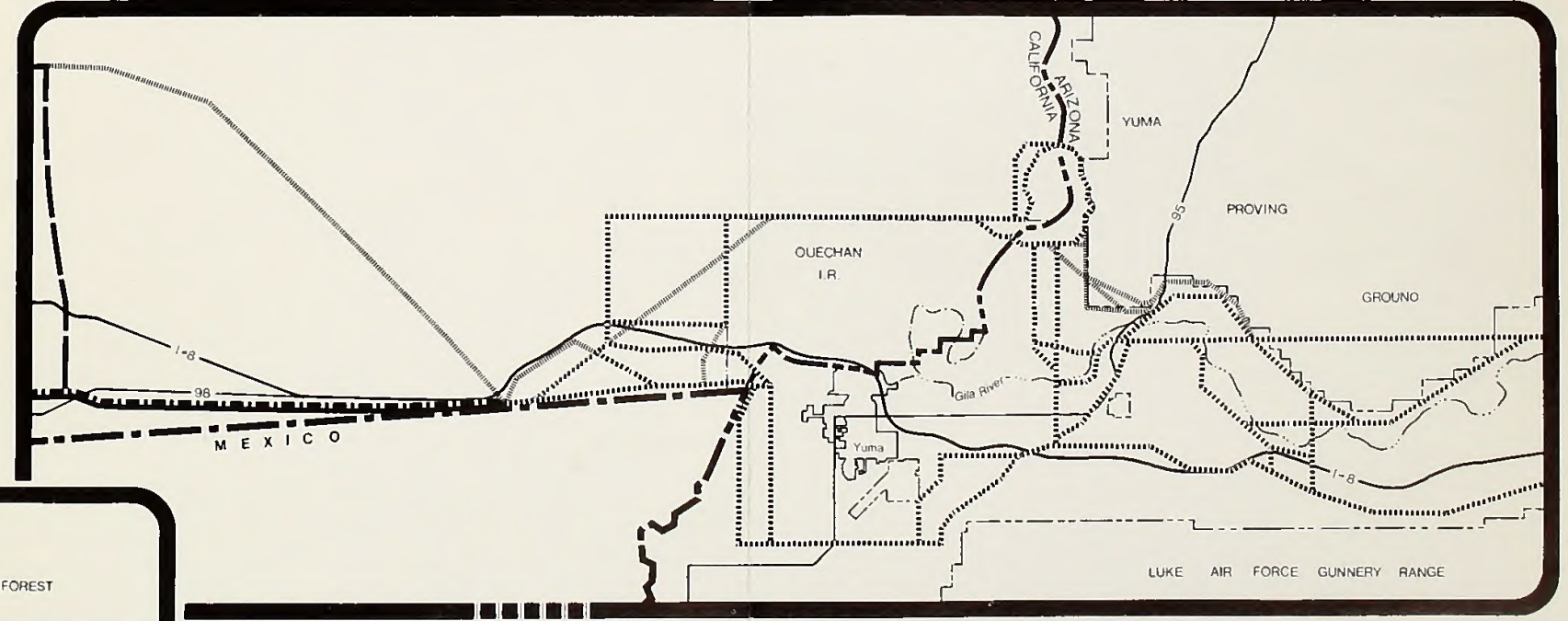
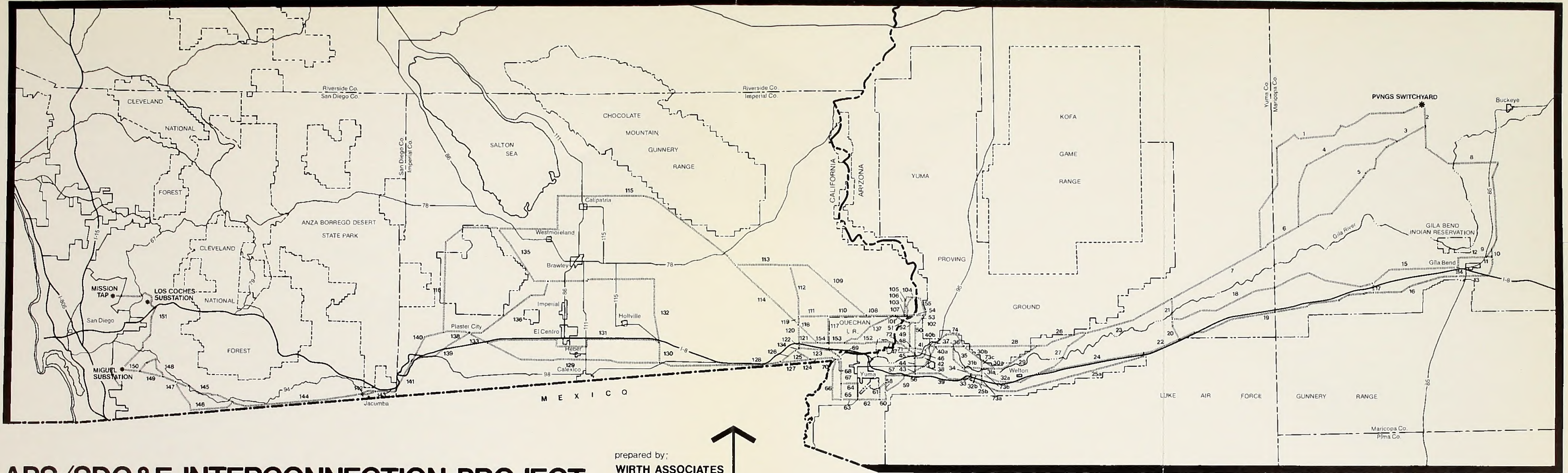


Figure 2-2(R)



APS/SDG&E INTERCONNECTION PROJECT

ALTERNATIVE PHASE II ROUTES

- 50 LINK AND NUMBER
- SUBSTATION/SWITCHYARD/TAP

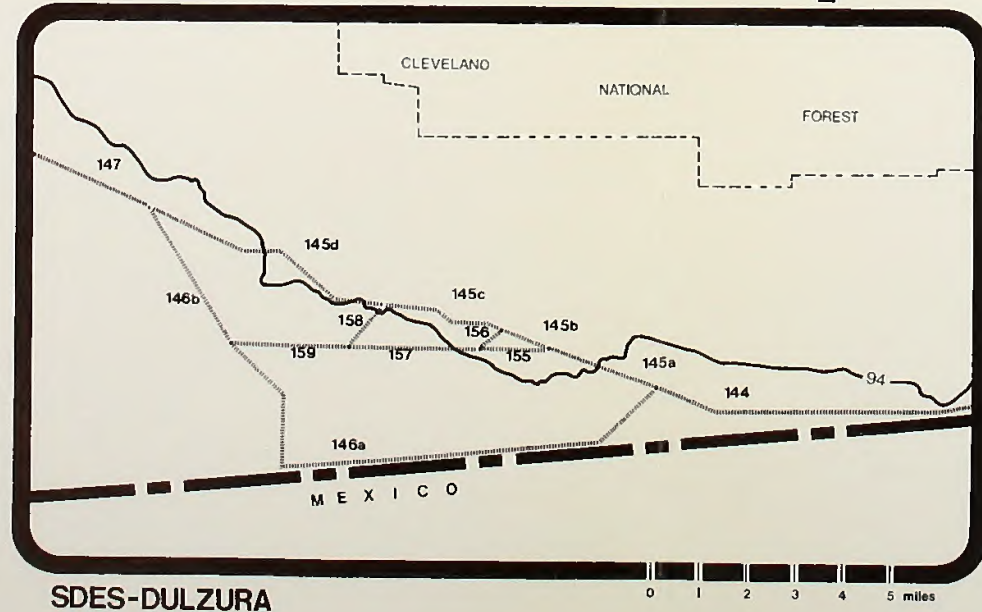
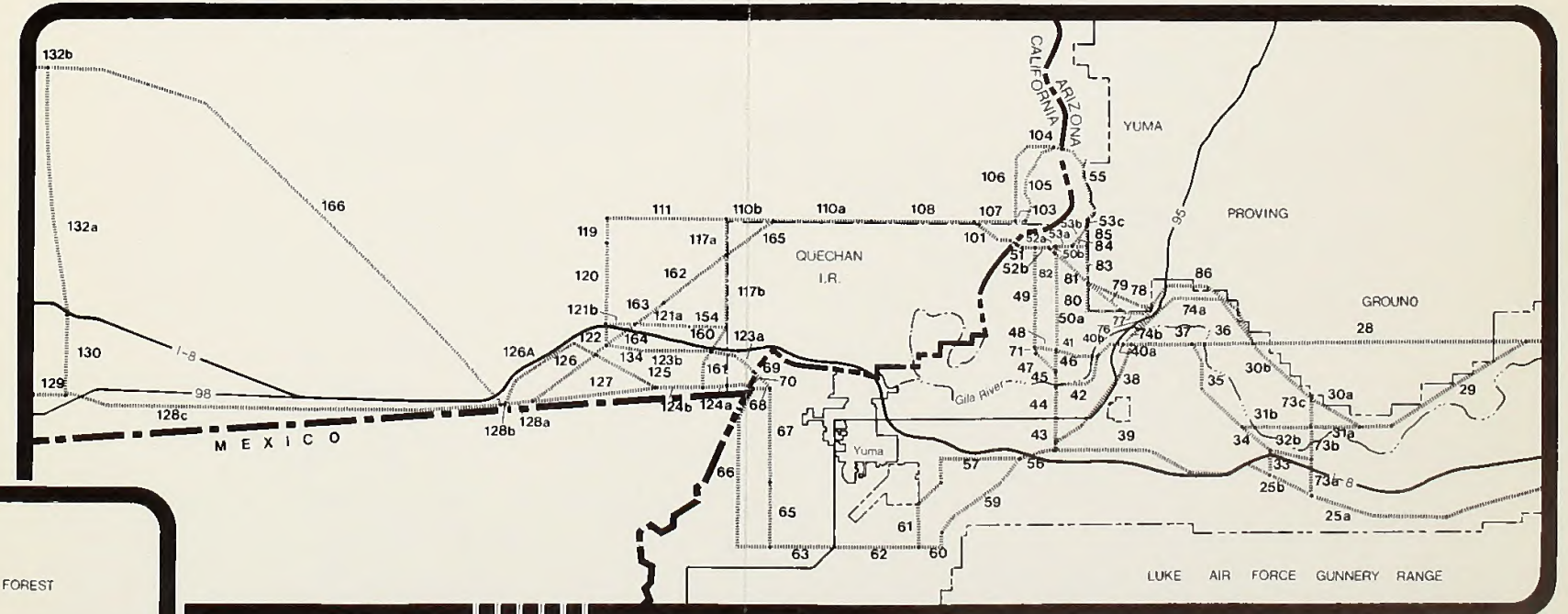
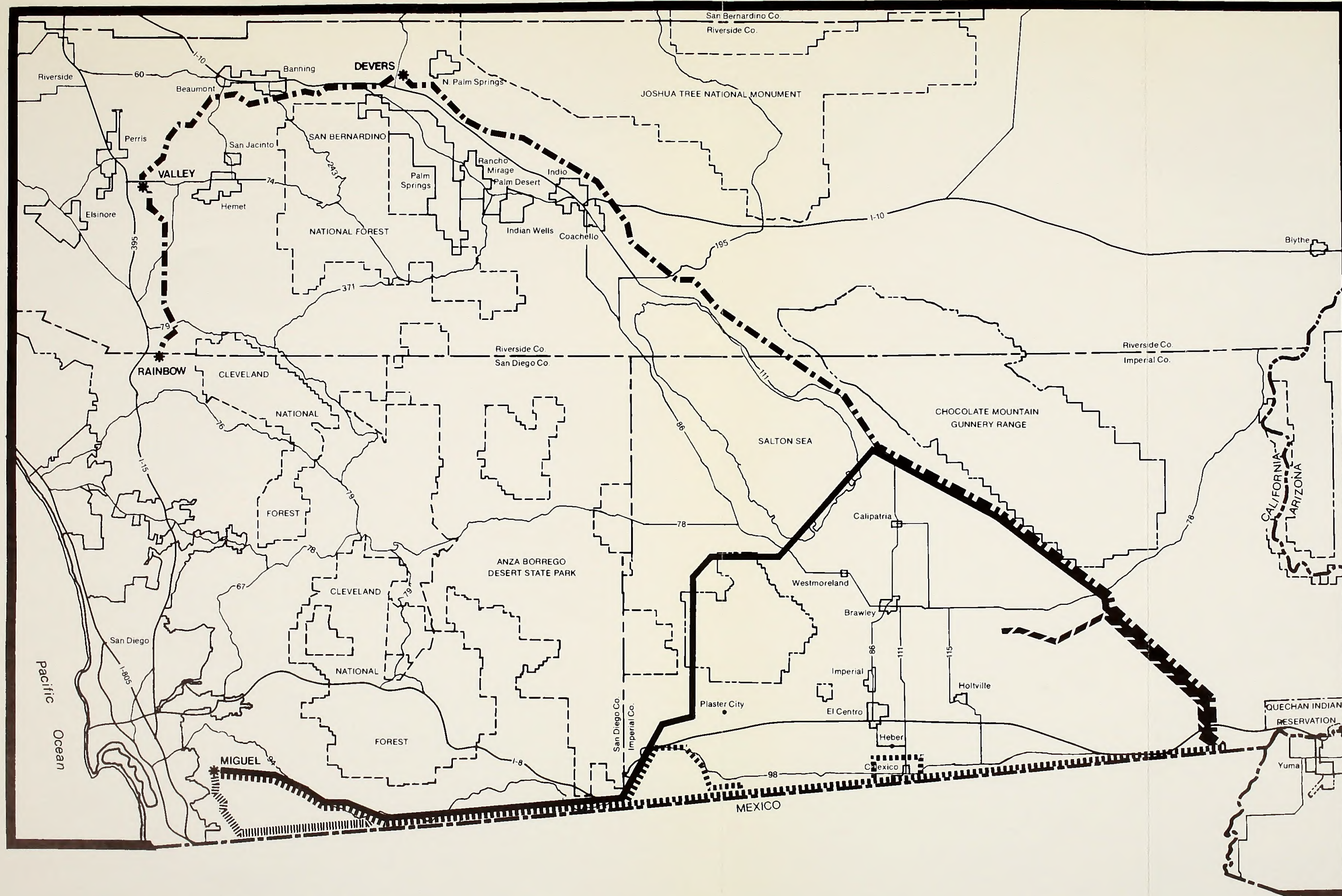


Figure 2-3(R)



ALTERNATIVE FEASIBILITY/ SUITABILITY ROUTES

- Salton Sea Alternative**
- Banning Pass Alternative**
- International Border Alternative**
- OTAY INTERNATIONAL BORDER
ALTERNATIVE ROUTE**
- NORTHERN SAND HILLS
ALTERNATIVE ROUTE**

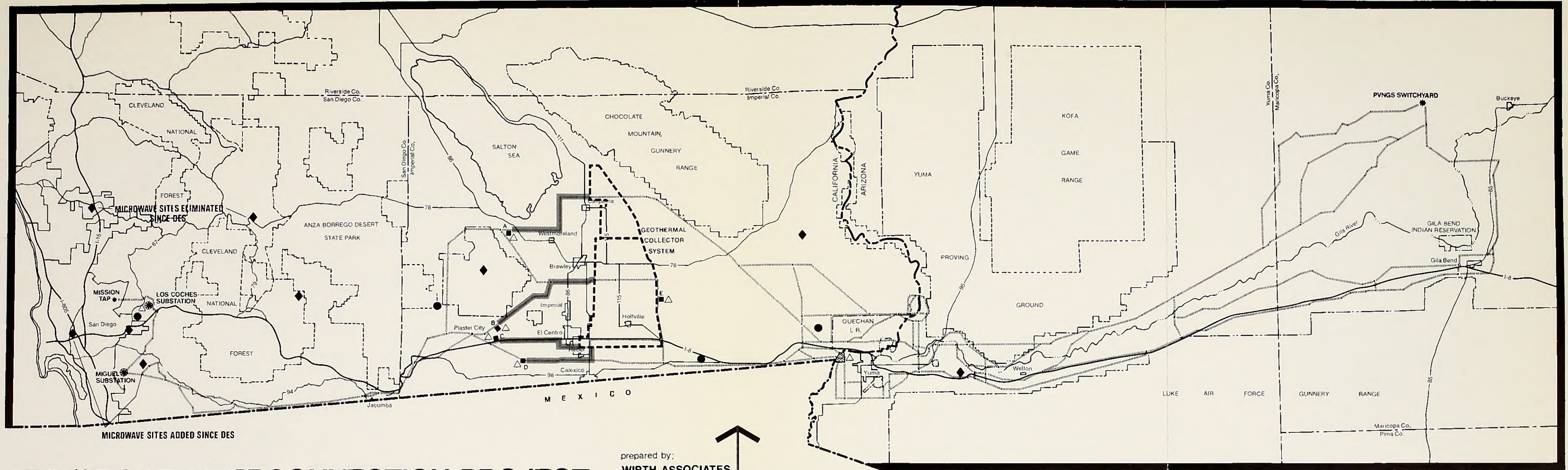


prepared by:
WIRTH ASSOCIATES



APS/SDG&E INTERCONNECTION PROJECT

Figure 2-4 (R)



APS/SDG&E INTERCONNECTION PROJECT

ANCILLARY FACILITIES

Substations

- Alternative Imperial Valley Substation Sites
 - Expanded (Los Coches, Miguel)
 - Alternative Yuma Substations
- Microwave Communication System**
- Associated with Substations
 - Associated with Existing Facilities
 - New Sites

69kV/161kV Transmission Lines

- Typical Alternative 161kV Transmission Corridor
- Typical Alternative 69kV Transmission Corridor

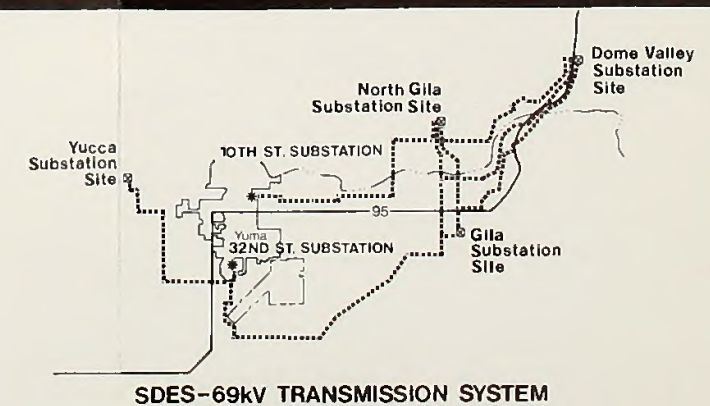
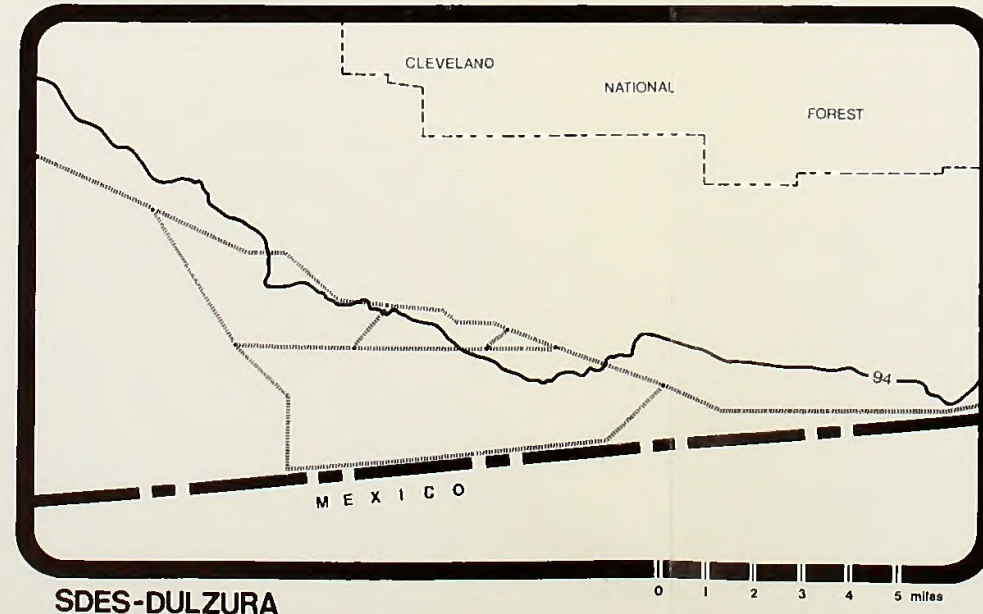
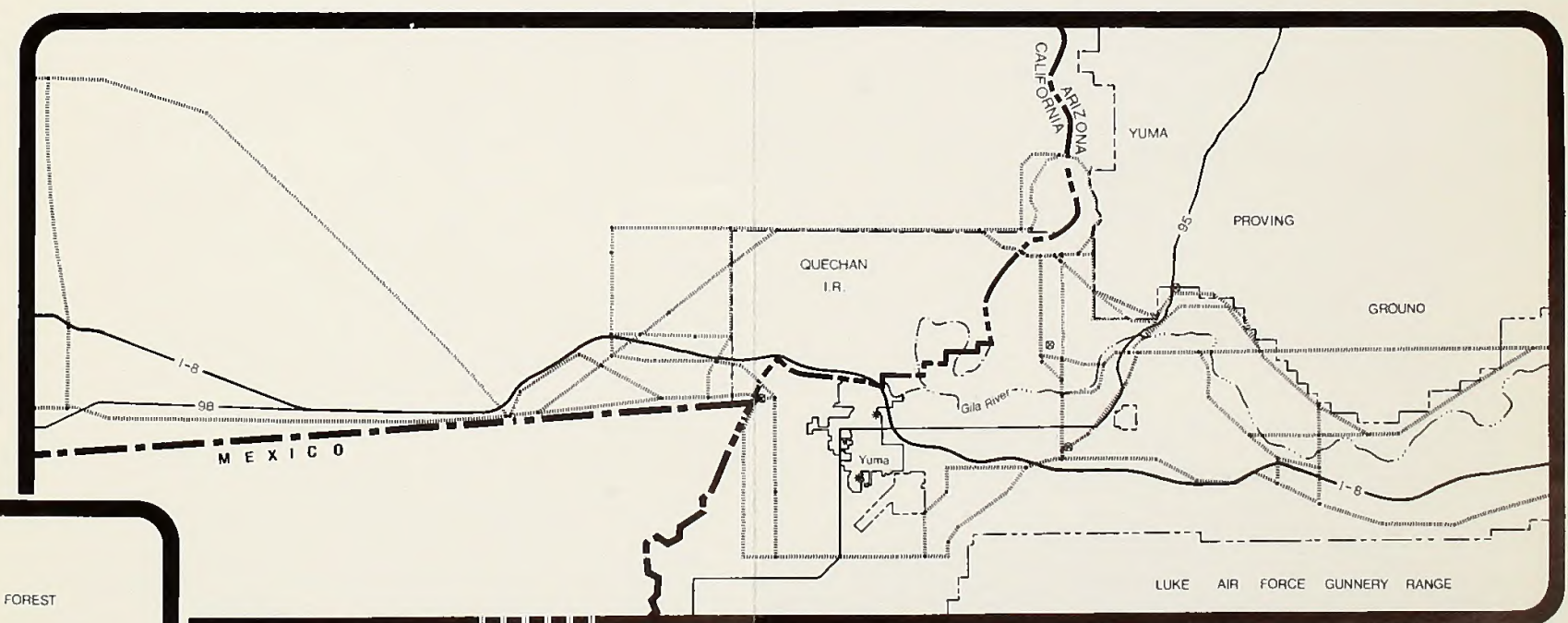
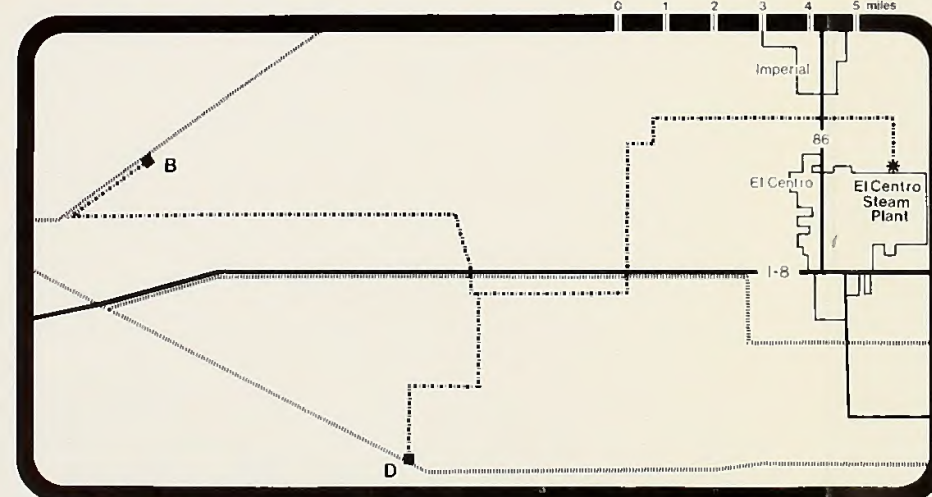


Figure 2-5(R)

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ALTERNATIVES INCLUDING THE PROPOSED ACTION



CHAPTER 3 - ALTERNATIVES INCLUDING THE PROPOSED ACTION

N.B. This chapter replaces Chapter 3 in the DES.

INTRODUCTION

Five general alternatives were considered by the Applicants to meet the need for oil and gas displacement and additional power in their respective service territories: no action, energy conservation and load management, alternative generation sources, alternative transmission systems and technologies, and the proposed action with routing alternatives.

NO ACTION

The no-action alternative (required for consideration under the National Environmental Policy Act (NEPA) regulations and defined here as the equivalent of the no-project alternative required under the California Environmental Quality Act (CEQA) regulations) has been interpreted in this environmental document to mean that no additional generating or transmission facilities beyond those included in their current resource plans would be constructed by Arizona Public Service (APS) or San Diego Gas & Electric (SDG&E). The utilities would, however, attempt to meet their need for additional power in San Diego and Yuma with existing facilities and various forms of mitigating measures to compensate for the anticipated shortfall in the supply of electric power, but would be unable to meet their objective for oil and gas displacement.

The immediate advantages of the no-action alternative would be the preclusion of adverse environmental impacts and financial costs associated with the construction and operation of new generating or transmission facilities, although monetary savings realized would depend on the costs of mitigating actions taken. The advantages, however, would have to be weighed against the disadvantages of the no-action alternative, which include loss of potential Project tax-revenues in addition to adverse environmental, socioeconomic and electric-service impacts that would result from or in spite of the following mitigating measures.

- I. In an effort to meet forecast need without new facilities, the utilities would probably increase generation from existing oil- and gas-fired units currently used for base load, thereby increasing oil and gas consumption. Not only are oil and gas more expensive as fuel sources than coal for base-load generation, but the use of oil and gas as primary fuels by utilities is discouraged by Federal energy policy (see the Powerplant and Industrial Fuel Use Act (PIFUA) of 1978); supplies of imported foreign oil are uncertain; and domestic production and reserves have been declining in recent years (U.S. Department of Energy, "Monthly Energy Review," December 1979).

Long-term supplies of power-plant gas for APS and SDG&E are forecast to be significantly less than current volumes and are highly dependent on approval and timing of new gas-supply projects. However, as a result of recent gas discoveries from rich sediment areas like the Overthrust Belt, Tuscaloosa Trend and the Anadarko Basin, there are some estimates of abundant supplies of gas. A decreasing and less-certain supply of gas would tend to cause the utilities to increase oil burn, which would result in substantially higher fuel costs and electric rates, and deterioration of existing air-quality in Yuma and San Diego. Increased emissions of suspended particulates, nitrogen oxides and sulfur dioxide might require retrofitting of additional emission controls at considerable costs, which would have a major impact on consumer energy bills.

Finally, even if APS and SDG&E increased generation from existing power plants, they could not meet projected peak demand with existing capacity and committed capacity with firm transmission. (See Figures 1-2(R) and 1-3(R)). APS's electric-supply shortfall would begin in 1986, and SDG&E's in 1988. The reserve margins shown in Figures 1-2(R) and 1-3(R) are necessary for regular maintenance and emergencies. Reduction of reserve margin would result in unacceptable reliability standards for each of the utilities.

2. In addition to increasing generation from existing power plants, APS and SDG&E would attempt to mitigate the results of no action by continuing and expanding energy-conservation efforts. A full discussion of the effects of current and planned conservation-programs can be found in the section, Energy Conservation and Load Management, which follows this section on No Action.

It should be noted that the demand forecasts shown in Figures 1-2(R) and 1-3(R) incorporate potential energy savings from conservation efforts. Even if energy savings, as quantified in the discussion on Energy Conservation and Load Management, could be doubled, they would be insufficient to significantly offset the shortfall in electrical energy that would occur in the mid-to-late 1980s in Yuma and San Diego.

3. A third possibility for mitigating the effects of the no-action alternative would be to increase power-purchases over interruptible transmission capacity. As indicated in Chapter 1, only limited quantities of interruptible capacity are available, and future amounts are expected to be substantially less than those required to mitigate fully the projected shortfall in electrical supply. Further, because this type of power transfer can be interrupted at any time, APS and SDG&E could not rely on interruptible transmission capacity for systems planning.

Some significant disadvantages or adverse impacts would result from the shortage in electrical supply even if the above mitigating measures were

implemented. Neither APS nor SDG&E (currently 70 and 82 percent oil/gas dependent in their Yuma and San Diego service territories, respectively) would be able to diversify fuel sources and, accordingly, reduce their oil dependency. An interruption to the oil supply could seriously affect their service. Access to coal-based energy in Arizona and New Mexico, and potential geothermal energy in the Imperial Valley and Mexico, would be precluded. San Diego and Yuma could be subject to rolling blackouts or brownouts; service might have to be interrupted more frequently for maintenance and emergency outages; and a moratorium on new hook-ups might become necessary. Such a situation could adversely affect residential, commercial and industrial customers in terms of income, health, safety and general convenience.

ENERGY CONSERVATION AND LOAD MANAGEMENT

Energy conservation refers to elimination of wasteful or unnecessary uses of electrical energy. It has the advantage of reducing energy consumption with no documented adverse environmental impacts. However, factors such as high capital cost (e.g., of solar water and space heating equipment), cost-effectiveness and public acceptance may inhibit the implementation of some energy-conservation programs.

In forecasting demand for the utilities, the California Energy Commission (CEC) has included in its demand forecast conservation savings that can be reasonably expected. And while it is recognized that other conservation measures may occur, they are too speculative for SDG&E to include in resource planning.

Load management refers to any utility program or activity intended to redistribute consumer demand from times of peak demand to times of off-peak demand, thus lowering utility requirements for peak generating capacity. Such measures must also be socially acceptable, cost-effective and environmentally compatible. Because load management is basically a load-adjustment measure, a ten-percent reduction in peak load may result in only a two-percent reduction in energy consumption. (Staff report on PG and E Load Management, PG and E General Rate Case A60153.)

At present, load-management programs are considered experimental in nature because they require additional evaluation of their impacts on a utility system and its ratepayers. Certain programs favor particular classes of customers, such as time-of-use rates applicable to firms having a demand greater than 1000 kW. Others are voluntary and offer incentives to encourage public participation, but may result in revenue losses for the utility. If voluntary experimental programs prove successful, they will probably be expanded.

APS and SDG&E have developed and put into effect numerous energy-conservation and load-management programs to educate customers on the necessity to conserve energy, and to encourage the prudent use of electricity through the application of programs appropriate for each class of customer.

Energy-conservation and load-management effects from utility (and, in California, state-mandated) programs have resulted in reduction of the utilities' forecasts of electric energy sales and system peak-demand. Peak demand forecasts for APS and SDG&E, as shown in Figures 1-2(R) and 1-3(R), incorporate estimated energy-conservation and load-management effects.

APS

APS uses the terms "energy conservation" and "load management" interchangeably, and offers a variety of programs to customers that include the following:

1. Hot Tap - A waste-heat recovery system distributed by APS to reduce electric water-heating costs.
2. Energy Consumer's Guide - A basic energy "answers kit" prepared and distributed by APS.
3. PHEAP - APS home energy-analysts visit private residences, at the customer's request, to detect sources of energy waste and recommend energy-saving measures.
4. Rate Incentive Programs - APS is presently conducting experimental programs involving several variations of time-of-day pricing. On October 21, 1980 the Arizona Corporation Commission directed APS to initiate use of the EC-1 residential energy-demand rate, a form of peak-load pricing, effective May 1, 1981. Use of the new rate is mandatory for all new residential air-conditioning customers and optional for present residential air-conditioning customers.
5. On-Site Load Controls - APS is presently conducting a public information program to inform customers of the availability of a variety of devices designed to assist them in taking advantage of the new demand-rates scheduled for implementation in May of 1981. The new demand-controlling devices were subjected to extensive testing and evaluation by APS prior to their introduction to the public.

Potential reductions in system peak-demand resulting from the load-management program have been factored into APS's load forecasts since 1977. APS's May 1980 load-forecast projects potential reductions in system peak-demand annually through 1990. In 1990 the estimated potential reduction attributable to the load-management program is 487 MW, 11.5 percent below the estimated peak without the program. Of the 487 MW potential reduction by 1990, 201 MW is directly attributable to peak-load pricing. Total reduction of peak load resulting from the program through 1979 was approximately 100 MW, or 3.9 percent. It is impossible to predict accurately the impact of APS's load-management programs in specific geographical areas; however, the Lower Colorado Service Area, which includes Yuma, represented approximately 6.5 percent of total system demand in 1980.

SDG&E

Among SDG&E's energy-conservation and load-management programs are the following:

1. Energy Audits - Comprehensive on-premise surveys by trained personnel to encourage the implementation of conservation techniques and purchase of conservation products to eliminate inefficient uses of energy in residences, and commercial and industrial establishments.
2. Conservation Product Sales - Promotion and sale of a variety of conservation products for the home, such as weather-stripping, swimming-pool covers, insulation, setback thermostats, solar shade-screens, water-heater insulating blankets and ventilation systems.
3. Energy Information - A wide spectrum of energy-conservation educational programs, including winter-all-electric customer direct mailer, high-bill prevention, conservation brochures, shows and exhibits, and builder education to encourage builders to incorporate in new dwellings a variety of energy-conserving devices and systems (including active and passive solar features) beyond local, state or Federal standards.
4. Voltage Reduction Program - Beginning in 1977, SDG&E implemented the first phase of a program to reduce average voltage for residential and commercial customers. By 1980, this program was saving energy at the rate of about 110 GWH* per year. A second phase of the program, which was begun in 1980, will save an additional 100 GWH per year by 1985 through cost-effective modifications to the distribution system. The energy savings result primarily from more-uniform and lower-average customer voltage and from loss reduction.
5. Time-of-Use-Rates Program - In 1977, SDG&E initiated a time-of-use rates program for customers with demands over 4,500 kW, which comprised approximately 11 percent of company sales. A second phase, applicable to all customers with demands between 1,000 and 4,500 kW, comprising approximately 10 percent of system sales, was implemented in June 1979. A third phase applicable to customers with demands between 500 and 1,000 kW was implemented in January 1981. The program encourages customers to shift consumption to off-peak periods and to reduce demand during on-peak periods. The short time-frame for the second and third phases of the program has precluded analysis of their impact.

*GWH is the abbreviation for gigawatt hours. A gigawatt equals one billion watts.

6. Residential Peak Load Cycling Plan - The development of the Residential Peak Load Cycling Plan established a method of testing and evaluating remote cycling devices. These devices are to be installed during the period July 1980 through October 1982, on approximately eight percent (7,200) of SDG&E's identified residential central air-conditioners, and on a selected group of residential electric water-heaters. The test installations are to determine whether it will be cost-effective for SDG&E to implement the program on a systemwide basis.

In 1979, SDG&E's effective conservation and load-management programs resulted in an electric-energy saving of about 168 million kWh and a reduction in peak demand of about 13 MW ("Report on 1979 Energy Conservation Activities," SDG&E, March 31, 1980). SDG&E expects the effects from energy-conservation and load-management programs to result in the following energy savings and reductions in peak demand.

	<u>Energy Savings</u> (GWH)	<u>Peak Demand Reduction</u> (MW)
1985	924	251
1992	1521	334
2000	2042	416

The estimated effects of conservation and load-management programs, which have been accounted for in SDG&E's long-term demand forecast shown in Figure 1-2(R), are the most likely reductions in energy and peak-demand requirements. The actual effect that the programs will have is uncertain at this time. Continued energy savings and demand reductions will depend on the cost-effectiveness and acceptability of certain programs. Even if the effects of these programs could be doubled, it is expected that SDG&E's existing and committed firm resources would be insufficient to maintain a 20 percent reserve margin after 1988 and meet the stated need. Also, conservation and load-management programs are not expected to substantially reduce SDG&E's dependence on oil or eliminate its need to develop additional power sources.

There exists a potential for expanded conservation programs beyond those included in the CEC projections. Financial-incentive programs to encourage retrofit applications of ceiling, wall and floor insulation, weatherization, active solar water- and space-heating, and appliance-efficiency improvements could lead to greater energy savings through conservation. We are not able at this time to determine which programs will be economically prudent within the life of the proposed Project, nor is it possible to reasonably assess the additional savings that would be realized from additional programs or to quantify the oil-and-gas displacement that would result from additional energy conservation. Therefore, it is not possible to consider additional conservation programs as an alternative.

ALTERNATIVE GENERATION SOURCES

Introduction

Among alternatives for meeting the utilities' stated needs would be adding generating capability. Neither APS nor SDG&E found this a reasonable alternative because of constraints of capital costs, national energy policy, environmental regulations, state-of-the-art technologies, and lead-time required to construct new generating facilities in relation to time-of-need. In the case of APS, no additional generating capability could be justified by the company's long-range forecast until 1990.

Most of the alternative generation sources considered by SDG&E, which are discussed below, would be located outside SDG&E's service area (off-system), most likely in areas east of San Diego, and would require new transmission facilities to deliver energy from each of the alternative generation sources to SDG&E's service area. Although a principal objective of the utilities is to reduce oil and gas dependence, all types of potential generating capabilities were considered.

SDG&E

Conventional Oil and Natural Gas

SDG&E presently generates most of its base-load energy from on-system conventional oil- and gas-fired power plants, which use a technology that is proven and reliable. Construction of additional conventional oil/gas-fired generating units would only increase SDG&E's dependence on oil/gas, which is contrary to the utility's stated need, to national energy policy and precluded by PIFUA as discussed in Chapter I.

Combustion Turbines

Combustion turbines are oil- and gas-fired generating units designed for peaking application. Despite low capital costs, combustion turbines have high fuel costs and are not economical for base-load generation. Installation of additional combustion turbine units would not only increase SDG&E's dependence on oil, contrary to national energy policy, but would also fail to meet the utility's stated need for supplementary base-load generation, because operation of peaking units is restricted by PIFUA to only 1,500 hours per year.

Combined Cycle

In combined-cycle power plants, the high-temperature exhaust gases from combustion turbines are directed to a heat-recovery steam generator, which produces steam for use in conventional steam turbines to generate additional

electricity. This use of combustion-turbine exhaust gases results in higher efficiencies for combined-cycle units than conventional oil- and gas-fired units. The major drawback to installation of new combined-cycle units for additional capacity is that current technology requires they be fueled with oil or natural gas, which would increase SDG&E's dependency on these fuels. Also, approval for construction of new combined-cycle power plants under PIFUA while possible, is difficult to obtain.

Repowering

Repowering involves making substantial changes in existing older power-plants to increase their capacity and improve efficiency. Substitution of combustion turbines to form a combined-cycle configuration was studied from 1976 through 1978 for several of SDG&E's existing units at Station B, Silver Gate, and South Bay power plants. The studies indicated that the most favorable conditions for repowering existed at Silver Gate Unit 2 and South Bay Unit 4.

The decision not to repower these units was based on several factors including cost-effectiveness, availability of substitute power during outage time required for conversion and air-quality constraints. The major drawback to repowering, however, is that current technology requires that the input fuel be oil or natural gas. Although repowering improves efficiency of existing units, substantial amounts of repowered facilities would have to be added in order to meet the stated need, thus significantly increasing oil and gas requirements, which is contrary to national energy policy. Also, repowered facilities would be treated as new facilities with respect to PIFUA.

Synfuels with characteristics similar to oil or natural gas may be suitable for repower projects, but there is no current or reliable near-term commercial supply of synfuel. Because of the lack of synfuel and the fact that increased reliance on oil and gas is clearly contrary to national energy-policy goals, repowering is not considered a feasible generation alternative.

Coal

Coal-fired power generation is considered a viable source of energy because a long-term domestic fuel supply is anticipated. In addition, coal-fired generation could displace oil and gas as primary fuel sources for base-load generation. No prohibitions to construct new coal plants presently exist; nonetheless, there are significant impediments to the siting of a coal plant in southern California.

The most suitable coal-plant sites in southern California are considered to be in the eastern desert area, which has been designated a nonattainment area for specified pollutants. Although proven technologies can remove relatively high percentages of emission impurities, questions remain as to whether remaining emissions will be allowed. Further, the efficiency of emission-control

equipment also determines the quantity of air emissions that are converted to a water-quality and/or solid-waste problem.

Solutions to these environmental problems are dependent to a large degree upon developing regulatory positions, interpretations and policies. In the 1990s, SDG&E plans to participate as a joint owner in one or more regional coal-fired projects. Although no such opportunities in southern California are presently available to SDG&E, joint-ownership coal facilities are included in the resource plan in the 1990s, as licensing prospects are expected to improve during the 1980s because national energy policy emphasizes greater dependence on coal. The experience of other California utilities with regulatory agencies during the 1980s is expected to establish firm guidelines, which do not exist today, for licensing a coal plant in California.

In addition to the environmental problems cited above, the lead-time for development of a coal plant is estimated to be ten years, which is beyond the initial period when additional power is required to meet projected need in the SDG&E service area.

Nuclear

In 1976 the California Legislature amended Section 25524.2 of the California Public Resources Code, which deals with nuclear power plants. The section as amended makes certification of new nuclear plants conditional upon the existence of technology for disposal of high-level nuclear waste. Until there is a revision in State law or a positive finding by the CEC regarding nuclear waste disposal, a new nuclear power plant sited within California is not a practical option. In addition, at least eight or nine years would be necessary to build the first unit of a nuclear generating power plant, which would place availability of energy from this source beyond the time-frame when additional power is required in the San Diego area.

Conventional Hydroelectric

Very few potential sites for installation of conventional hydroelectric generating facilities exist in SDG&E's service area. Even if it were feasible to install hydroelectric units at the few sites available, each unit would be small, and the total capacity that could be generated is optimistically estimated to be no greater than 34 MW, which would be insufficient to meet the stated need. The cumulative value of small hydroelectric projects is recognized, and development of such projects by local water agencies is encouraged by SDG&E's readiness to purchase the available power.

Pumped Storage Hydroelectric

In a pumped-storage facility, electricity is generated by releasing water from one reservoir to another, of lower altitude, through a turbine. Water in the

lower reservoir is subsequently pumped back to the upper reservoir for release when needed. Such an arrangement is primarily suited for peaking power, and would therefore not satisfy SDG&E's need for low-cost, base-load energy. In addition, pumping back might increase SDG&E's oil consumption, given the utility's existing and committed resources which operate largely on oil.

Geothermal

SDG&E has been actively engaged in geothermal energy exploration, research and development in the Imperial Valley of southern California since January 1971. With the assistance of the Department of Energy (DOE), SDG&E has constructed and operated the Geothermal Loop Experimental Facility at the Niland Reservoir to determine the effects of operation with high-salinity brine, and to help assess the capacity and characteristics of the Niland reservoir.

SDG&E continues to be active in the development of geothermal resources in the Imperial Valley, and has also signed contracts to purchase the electricity from commercial-scale flash-cycle geothermal power-plant developments by Magma Power Company at Niland. Target dates for operation have been set for 1983-1984. In addition, SDG&E has signed an agreement with DOE, Electric Power Research Institute (EPRI), the Imperial Irrigation District (IID) and the California Department of Water Resources for cost-sharing of a commercial-scale binary-cycle demonstration geothermal power-plant to be located at Heber. The facility is scheduled to begin generating as a demonstration program in 1984-1985.

However, before the Imperial Valley's geothermal potential can be realized, and electric power generation developed from geothermal resources in the Valley, critical economic, technical and environmental uncertainties must be resolved through the operation of prototype demonstration plants of commercial size. In addition, new transmission facilities would be needed to deliver geothermal power from the Imperial Valley to San Diego.

Geothermal energy is included as an element in SDG&E's resource plan, as current activities in the development and application of geothermal resources in the Imperial Valley are expected to prove the economy and reliability of this resource by the late 1980s. Subsequent geothermal developments of greater magnitude are dependent upon successful demonstration. Therefore, geothermal energy in addition to that currently included in SDG&E's resource plan does not represent an alternative source of power for meeting the utility's stated need by the late 1980s. However, future geothermal developments will help diversify the utilities' fuel mix and reduce oil and gas dependency.

Purchase from Mexico

On November 12, 1980, SDG&E and Southern California Edison (Edison) signed an agreement with Comision Federal de Electricidad (CFE), the Mexican

utility system, for the purchase over ten years of 220 MW of geothermal capacity and associated energy, of which SDG&E would receive 150 MW, starting in May 1984. The delivery of this power purchase requires new transmission facilities.

Additional geothermal power from Mexico may be available for purchase in the future, and SDG&E has, accordingly, included another 180 MW in its resource plan. However, negotiations, which would include point of delivery, have not been initiated for purchase of additional power and, therefore, this resource cannot be considered firm.

Cogeneration

Cogeneration is the utilization of waste heat for electrical generation, industrial processes or for space heating and/or cooling. A typical cogeneration installation consists of a combustion turbine fueled by either natural gas or distillate oil coupled to a heat-recovery boiler.

Applied Energy, Incorporated (AEI), a wholly owned subsidiary of SDG&E, operates three such cogeneration facilities, which have a combined capacity of 62 MW, on U. S. Navy bases in the San Diego area. AEI also operates an 800 kW (0.8 MW) facility at Rohr Industries in Chula Vista, California.

SDG&E reports that discussions with companies in San Diego over the last several years revealed the potential for up to 76 MW of additional cogeneration comprised of many small installations; however, not all companies with cogeneration potential are willing to commit to cogeneration until the economics of a particular cogeneration scheme is known. At present, 36 MW of the potential 76 MW are considered likely to be implemented (SDG&E 1980).

The CPUC considers cogeneration projects not only reasonable alternatives but preferred alternatives. In terms of meeting the Applicants' stated needs, however, the development of cogeneration potential within the SDG&E service area would appear to make only a limited contribution.

Wind Turbine Generators

Wind-turbine generators have already proved to be technologically feasible. However, reliability of generation is dependent on the amount of available wind in the service area where wind turbines can be employed. For utility systems, large wind-turbine generators are being developed in the range of 200 kW to 4000 kW. Generators, to be effective, must be installed in clusters (wind farms) of 100,000 kW or more, either in mountain passes or on windy

plains. Dependable capacity* for wind turbine generators has been estimated to be between 30 and 40 percent. Therefore, in order to smooth out the energy output variations, many wind farms may be required, and would have to be interconnected by a grid system of transmission lines. For SDG&E to rely upon wind-farm generation, it might be necessary to enter into agreements with developers in areas such as the San Geronio Pass. This would require large-scale wind-farm development not likely to be available on an adequate scale in this decade.

Solar Energy

Photovoltaic cells convert light into electricity. When light strikes substances such as silicon, gallium arsenide or cadmium sulfide inside a photovoltaic cell, the cell separates the resulting positive charges and electrons (negative charges). This separation sets up a flow of direct current electricity which can be channeled out into storage batteries, appliances or a utility's grid.

Since the development of photovoltaic cells in 1954, current predictions as to when this technology will be economically competitive with coal are not in agreement.

Two of the most promising raw materials for advanced photovoltaic technologies incorporate cadmium and arsenic, both of which are very poisonous substances. In addition, other toxic substances and metals, plastics and glass are required for solar production. The use of these materials would have to be weighed against environmental effects of other technologies in determining the future of this method of power generation.

Other solar-energy technologies include the use of large concentrators to focus sunlight on a receiver to heat water, or some other molten substance, to a sufficiently high temperature to make steam to generate electricity. Unless this technology is used solely to supplement other current generating technologies, energy-storage devices (such as batteries) would be needed for periods of darkness or insufficient sunlight.

Solar ponds are another possibility for the generation of electricity. This method uses the temperature differential of hot and cold layers in a salt pond to vaporize a contained volatile fluid to a gas, such as freon, to drive a turbine to generate electricity. Feasibility studies are currently being conducted by Edison and the CEC for a 5 MW plant using the Salton Sea as the heat sink. It is projected that commercial availability could occur in 1991 and commercial operation in 1994. If the Salton Sea project proves practical, additional generating facilities could be constructed.

*"Dependable capacity" here refers to the capacity factor, which is the amount of energy produced over a period of time expressed as a percent of the total potential energy output during that period.

Large-scale solar generation is not presently cost-effective which may prevent wide-spread utility use until after 1990. However, based on discussions with the Atlantic Richfield Company, SDG&E foresees the possibility of up to 25 MW of photovoltaic cells on its system by the late 1980s.

Biomass Electrical Generation

Biomass electrical generation makes use of a variety of organic materials that can either be burned or converted to gas or liquid fuel. Potential sources of biomass fuel are forest and agricultural wastes, including animal manures, land and ocean energy crops, and refuse-derived fuel from municipal solid wastes. Three methods considered equal in efficiency are currently in use to convert biomass to fuel: direct burning, bioconversion and decomposition by heating. There are many environmental problems that could be corrected with more advanced technologies in air- and water-pollution control and equipment design for safety. The disposal of wastes may still pose a significant problem as the municipal solid wastes are highly heterogeneous and can contain small amounts of hazardous and toxic compounds. The major problems with biomass generation are not technological, but economical, institutional, contractual, legal and environmental. Although biomass generation is not included in SDG&E's current resource plan, SDG&E is pursuing biomass as an alternative generation source for the future. The CEC estimates 500 MW of biomass electrical generation in California by 1992.

Other Technologies

A variety of other technologies have potential as future sources of energy to displace gas and oil, including fuel cells, synthetic fuel from coal and oil-shale, fluidized-bed thermal conversion, ocean thermal conversion, wave and tidal conversion, fusion and magnetohydrodynamics. These technologies are in various stages of development; commercial availability depends on successful demonstration of their technical, economic and environmental feasibility. However, none of these technologies is expected to be available within the time-frame of SDG&E's stated need and cannot, therefore, be considered as viable alternatives for additional power.

Cumulative Effects of Alternatives

Although the alternatives described above were considered separately, they were also considered in combination to determine their cumulative effects in meeting the stated need for additional power and oil and gas displacement.

An initial screening of alternatives, illustrated in Table 3-1, was based on two criteria, derived from the stated need, which required that each alternative:

1. Reduce oil and gas requirements.
2. Meet the time requirement (1984-1988).

Improved reliability, financial requirements, economic viability and other feasibility criteria were not considered in the initial screening.

For each of the potential alternatives that passed the initial screening, a range of capacity-values is presented in Table 3-2(R). The maximum values shown are judgmental and exceed the projections in SDG&E's current Resource Plan (demand forecast). SDG&E believes it has incorporated in its current Resource Plan all reasonable measures. The basis for the value range of each alternative presented in Table 3-2(R) is briefly described below.

Additional Conservation - Public Resources Code Section 25309(b) requires the inclusion of reasonable conservation, load-management or other demand-reducing measures in the CEC's Biennial Report (BR III) on demand forecast. Accordingly, CEC's demand forecast has incorporated reasonable measures to be taken by SDG&E, including customer response to utility- and government-mandated programs already adopted. The following table lists those conservation measures included by the CEC staff in their forecast for each utility.

- Residential Building Standards
- Appliance Efficiency Standards
- Insulation Retrofit
- Electric Resistance Heating Cost-Effectiveness
- Load Management
- Water Heater Blanket Retrofit
- Solar Water Heater Retrofit
- Solar Water Heater Retrofit for Pools
- Local Solar Ordinances
- Nonresidential Building and Equipment Standards
- Utility and Load Management Audits
- Time-of-Use Electric Rates
- Street Lighting Conversion
- Lighting Standards
- Schools and Hospitals Program

Table 3-2(R) reflects power savings included in the CEC Biennial Report on demand forecast.

Small Hydroelectric Generation - A small-scale hydroelectric project is one of installed capacity of 30 MW or less. Electricity is generated by releasing water from pipelines, canals and small dams through a turbine. The technology, which is well-established but not fully exploited, is most appropriate for peaking purposes.

California small-scale hydroelectric generation potential is estimated at 1,000 MW. SDG&E estimates that within its territory 34 MW of hydroelectric

TABLE 3-1(R)
SCREENING FOR CUMULATIVE EFFECTS OF ALTERNATIVES

Screening Criteria	Alternatives	Additional Conservation	Load Management	Conventional Oil & Gas	Combustion Turbines	Combined Cycle	Repowering	Coal	Nuclear	Conventional Hydro	Pumped Storage	Geothermal	Purchase from Mexico	Cogeneration	Other ¹
(A) Reduce Oil & Gas Requirements		Y	N	N	N	Y ⁵	Y ⁵	Y	Y	Y	N	Y	Y	Y	Y ²
(B) Meet Time Limit (1984-1988)		Y	Y	N	Y	N	N	N	N	Y ³	Y ³	Y	Y	Y	Y ⁴
Meets Requirements of (A) and (B) Above		Y	N	N	N	N	N	N	N	Y	N	Y	Y	Y	Y

¹Includes wind, solar, biomass, fuel cells, etc.

²Fuel cells would not reduce oil and gas requirements.

³At existing reservoirs only.

⁴Wind energy only.

⁵Increased efficiency results in minor reduction in oil use.

Source: San Diego Gas & Electric, 1980.

TABLE 3-2 (R)
ESTIMATED CUMULATIVE CAPACITY AVAILABLE FROM ALTERNATIVES
ALL VALUES IN MEGAWATTS

Year	Additional Conservation		Hydroelectric		Additional Geothermal		Additional Purchase From Mexico		Additional Cogeneration		Wind		Biomass		Solar		Total Alternatives	
	Potential Range	Realistic Estimate	Potential Range	Realistic Estimate	Potential Range	Realistic Estimate	Potential Range	Realistic Estimate	Potential Range	Realistic Estimate	Potential Range	Realistic Estimate	Potential Range	Realistic Estimate	Potential Range	Realistic Estimate	Potential Range	Realistic Estimate
1984	0-?	0	0-34	6	10-100	0	0	0	0-76	36	0-2	0	0-0	0	0-25	0	10-237	42
1985	0-?	0	0-34	6	10-100	0	0	0	0-76	36	0-2	0	0-0	0	0-25	0	10-237	42
1986	0-?	0	0-34	6	10-100	0	0-70	0	0-76	36	0-2	0	0-20	0	0-50	25	10-352	67
1987	0-?	0	0-34	6	10-100	0	0-180	0	0-76	36	0-10	0	0-20	0	0-75	25	10-495	67
1988	0-?	0	0-34	6	10-100	0	0-180	70	0-76	36	0-10	0	0-20	0	0-100	25	10-520	137

Source: San Diego Gas & Electric, 1981

capacity could possibly be developed. Of this potential, water agencies have expressed interest in developing up to 4 MW of capacity.

Geothermal - SDG&E assumes that to obtain maximum potential, three of the four Imperial Valley geothermal areas need to be developed (SDG&E has no option in the Brawley area). A 10 MW plant constructed by Magma Power Company is in the start-up process. SDG&E has the option to purchase the power, which represents the minimum potential. The utility's use of this potential power, however, would require new transmission facilities for delivery to San Diego. The probable value assumes development by SDG&E (or another developer who will sell to SDG&E) at Heber and Niland. The Republic East Mesa development is given a low probability of success.

Purchase from Mexico - The maximum potential for power purchases from Mexico has been established on the basis of ongoing discussions between SDG&E and Mexico (CFE). An agreement was signed on November 12, 1980 to purchase 220 MW of Cerro Prieto power from Mexico beginning in May 1984. Of this amount, SDG&E's share would be 150 MW and Edison would receive 70 MW. CFE has expressed its desire to deliver power to Mexicali/Calexico near the Cerro Prieto Plant rather than to Tijuana. CFE may be willing to upgrade its transmission line and deliver the power to Tijuana for a higher price. If power is delivered to Mexicali/Calexico, a transmission line to SDG&E's service area would be necessary.

Additional Cogeneration - SDG&E has assessed the potential for additional cogeneration (above the 76 MW maximum potential) within its system, and considers 6 MW reasonably probable, and 1 MW highly probable. (See discussion of Cogeneration on page 3-11s.)

Wind - Little is known about the potential for wind-energy development in SDG&E's service territory. Wind energy is not presently a commercial technology for substantial capacity (2 MW units and larger). Nonetheless, the California Legislature has mandated that 500 MW of wind energy be developed and operating in the state by 1987. The CEC BR III has targeted 100 MW by 1985 and 2,500 MW by 1992. As SDG&E represents approximately six percent of California's electrical system, 10 MW, or six percent of the mandated 500 MW, is considered maximum potential at 30 percent capacity factor.

Summary

The range of capacity available from potential alternatives is shown in Table 3-2(R). Because the values were developed from conjecture, however, it is unrealistic to expect maximum development of potential. Any of the alternatives could play an increasing role in meeting energy needs. But

because of the uncertainty of the availability of each component described above, they were considered not to meet the stated need in combination.

APS

An alternative for APS to meet the need for additional power in the Yuma service area would be to expand generating capacity in the region. Although seven methods of developing generating capacity in the Yuma area and their viability are analyzed below, both individually and cumulatively, it should be noted that prior planning by APS has provided for sufficient energy to meet forecast needs in the Yuma area through the development of generation facilities elsewhere in its system. Only transmission capacity is required. All alternative methods of generation have been rejected for the Yuma region based on varying rationales; however, the lack of economic viability is common throughout when compared to the transmission alternative.

Conventional Oil and Natural Gas

Oil and gas represent two of the scarcest and most expensive sources of fuel. Construction of oil- or gas-fired generating units to meet the growing load-demand in the Yuma area would result in uneconomical base-load operation of the units. The addition of oil- and gas-fired units would also increase the oil and gas dependency of APS-Yuma resources (already 70 percent oil/gas dependent), in direct violation of PIFUA and national energy policy.

Coal

Assuming that existing environmental and emission requirements could be met, the eight-year lead-time for construction of a coal-fired plant would place commercial operation of a new coal plant unacceptably beyond the time-frame when additional capacity is needed in the Yuma area.

Nuclear

The high capital-intensity that characterizes nuclear plant construction dictates that advantage must be taken of economy of scale in order to make nuclear power economically feasible. To achieve economy of scale, a unit size between 500 MW and 1,000 MW would be required. A nuclear unit of this size, located in the Yuma area, would require the construction of substantial extra-high-voltage (EHV) transmission capacity to export surplus capacity. Such a scenario has no economic merit. In addition, APS estimates the lead-time for construction of a nuclear plant to be more than ten years, making the generation capacity from this source unavailable until well beyond the time-frame when it would be required.

Cogeneration

For a definition of cogeneration, see the discussion of cogeneration under SDG&E.

In the Yuma area no significant cogeneration potential has been identified, and therefore cogeneration cannot be considered as an alternative in meeting the stated need.

Wind

Commercial electric-power production from wind-driven turbine/generators requires sustained wind-speeds that average 12 to 15 mph. The Yuma area, as well as the greater part of the State of Arizona, is generally located in an area of low wind-potential. Wind power is, therefore, not considered a feasible alternative source of power to meet the stated needs of the Yuma area.

Solar

Solar energy has the potential of making a significant contribution to the energy needs of the State of Arizona, and APS is actively engaged in its development. The technology exists today for commercial central-station electric-power generation employing either direct thermal conversion or photovoltaic processes. However, economically, neither of these solar technologies is expected to be competitive with conventional sources within the time-frame of the stated need.

Biomass Electrical Generation

For a definition of biomass electrical generation, see the discussion of biomass generation under SDG&E.

An economic evaluation of a recently proposed biomass project in the City of Yuma in which municipal refuse would be burned to generate heat, which, in turn, would be used to generate electricity, resulted in abandonment of the proposal.

Given the time constraints and present and projected uneconomic position of large-scale biomass projects, no contribution to the stated needs of the Yuma area can be expected from this potential source of energy.

Purchase

No known generating capacity is available for purchase in the Yuma area in the time period when additional capacity is required by APS.

Cumulative Effects of Alternatives

None of the alternatives was demonstrated to be independently viable regardless of generation type or capacity, nor were they proved to be effective in combination for meeting the stated need.

ALTERNATIVE TRANSMISSION SYSTEMS AND TECHNOLOGIES

An alternative for meeting the stated need of SDG&E and APS would be to transfer surplus energy from generation sources outside San Diego and Yuma, using existing or new transmission systems and/or technologies. And, since a principal concern of both utilities is to obtain reliable base-load generation that is not oil- or gas-fired, it would seem only logical to consider ways to transfer energy from existing coal-fired power plants.

The major sources of available coal-fired electrical energy within a practical geographic range of the utilities' service areas are located to the east of San Diego and Yuma, in Arizona and New Mexico. Therefore, the utilities concentrated on examination of transmission alternatives, including existing transmission capability, between coal-fired power sources to the east and Yuma and San Diego.

It was determined that sufficient transmission capability will exist in the 1980s for deliveries of SDG&E's firm bulk-power purchases from coal-fired plants to Palo Verde Nuclear Generating Station (PVNGS) Switchyard, west of Phoenix. Accordingly, the transmission alternatives under consideration involve capability between PVNGS, and Yuma and San Diego.

EXISTING AND PLANNED TRANSMISSION FACILITIES OWNED BY OTHER UTILITIES

There are, at present, no existing or other planned transmission facilities that directly connect PVNGS with the SDG&E service territory (see Figure 3-1). Lines indirectly connecting the two areas are either fully utilized or fully committed to future planned requirements. Attempts to secure firm transmission rights for delivery of its contracted power over facilities owned by other utilities between Arizona and the SDG&E service territory have resulted in an agreement with Edison to use 205 MW of Edison's Palo Verde-Devers 500kV line for four years, from May 1982 to May 1986. In May 1986, PVNGS Unit No. 3 is scheduled to be in operation and Edison will require the transmission capacity of the Palo Verde-Devers line for its own use. There is no other transmission service available between PVNGS and the SDG&E service area.

A 230kV line, owned and operated by CFE, parallels the U. S. Mexican border on the Mexican side. A possible means of meeting the stated need (and inter-connecting APS and SDG&E) would be to build a transmission line from PVNGS

through Yuma to some point of intersection with the Mexican line. Such an approach would not be practical for several reasons: the transmission capacity would be insufficient to meet the utilities' projected needs, even if the line's full capacity were available to APS and SDG&E; extensive international agreements would have to be negotiated; and, although substantial construction would be involved at the expense of APS and SDG&E, they would not have full control over the use and maintenance of the line running through Mexico. Finally, such an arrangement would not provide the desired level of system reliability.

ALTERNATIVE TECHNOLOGIES

Alternative Transmission Line Voltages

Power-transfer-capability is one of the most important factors in choosing the appropriate voltage for a transmission line. Standard voltage levels besides the 500kV considered for a transmission system were 345kV and 765kV.

A 765kV transmission line, nominally rated at 2000 MW, would have excess capacity, as well as unnecessary environmental and economic costs incurred from the requirement for a wider right-of-way and increased capital costs for materials and electrical facilities. At 345kV, nominally rated at 500 MW, at least two lines would be required, which would cost more, require a wider right-of-way and more materials and potentially result in greater environmental impacts than a 500kV line.

Direct Current Overhead Systems

A direct current (dc) power transmission system is a possible alternative to an alternating current (ac) system. If a dc transmission system were to be built, converters - which change ac to dc - and inverters - which change dc to ac - would be required at each terminal of the transmission line.

In general, a two-conductor dc system is economically competitive for transmitting power from point to point over route-distances greater than 400 miles, the distance necessary for savings in line construction to offset the cost of the converter-inverter stations. The distance between PVNGS and San Diego is approximately 280 miles, which does not fall within the desirable range for a two-conductor dc system to be competitive. A dc system with two converter-inverter stations, and having the equivalent power-transfer-capability of a 500kV ac line, would be approximately twice as costly as a 500kV ac line, with - on balance - no apparent environmental benefits. The need for additional stations at Yuma and Imperial Valley would simply increase the substantial cost advantage of an ac system. A dc system, therefore, cannot be economically justified and is not a viable alternative.

Underground Construction

At the present time, while it is technically feasible to install 500kV ac underground transmission lines, few have been installed in the United States, and no long-distance pipe-type cable transmission systems are known to be in operation. The longest known underground EHV transmission line is 0.2 mile long.

To dissipate the heat generated by the conductors, several underground cables would be required to transmit the power that could be handled by one overhead transmission line. The problem of dissipating the heat would be particularly difficult to overcome in the desert through which an underground line would pass between PVNGS and San Diego.

In addition to the cable, pipe and oil, ancillary facilities - such as cable terminators, oil-pressurizing and pumping plants and reactor stations - would be required to complete the underground system. Because of the capacitive reactance of the underground system, the length of each underground circuit would have to be limited to approximately 25 miles without shunt compensation. Oil-pressurizing and pumping-plant facilities would be required every 15 to 20 miles along the transmission-line route over level terrain, and more frequently in hilly or mountainous terrain, in order to keep large oil-pressure differences from damaging the cables. All such ancillary equipment would be visible and installed on or adjacent to the right-of-way.

While underground lines are relatively immune to weather conditions, they remain vulnerable to dig-ins, washouts, seismic events and cooling-system failures. These complications can result in service outages lasting days or weeks, rather than the hours usually required to correct overhead failures. Outages of long duration would be unacceptable for a circuit carrying bulk power to serve a major urban community.

Estimated 1979 costs for undergrounding a 500kV transmission line would be approximately \$4.1 million per mile, or roughly 13 times the cost of constructing an overhead system of comparable capability.

During construction, the environmental impacts of an underground system would be similar to those from constructing a pipeline, which requires a continuous line of trenching and backfilling between terminal points. As a result, considerably greater adverse environmental impacts could be expected than from construction of an overhead line. After construction, access to the cable system would be required throughout its length for repairs and regular maintenance, in contrast to the overhead system, which requires structure-access only.

The principal environmental benefits of undergrounding a transmission system involve elimination of adverse visual and aesthetic impacts; however, on balance, the environmental benefits of undergrounding do not appear to outweigh the adverse impacts.

Considering the technical complications, economic and environmental costs, and accessibility, an underground ac system - either in part or in total - is not a viable alternative.

Underground dc transmission systems have received little developmental consideration to date. Nonetheless, such systems would encounter problems and constraints similar to those described above for ac underground systems.

New Methods of Transmission

No method different from those described above is presently available for the economical bulk-transmission of electric energy from a generating source to load centers. While there is continuous research on the possibilities of microwave and laser transmission of energy, these methods are not currently practicable for long-distance transmission and cannot, therefore, be considered as alternatives.

PROPOSED ACTION

Investigation of the alternatives described above led APS and SDG&E to the conclusion that the optimal means for supplying power to their respective service territories within the time-frame of the stated need (given the economic, environmental, national energy-policy and state-of-the-art constraints of alternative actions) would be by constructing an overhead ac transmission system between the APS main system and its Yuma service territory and a bulk-power delivery center near San Diego. It should also be noted that, subsequent to suspension of the Sundesert Project, CPUC directed SDG&E to study the feasibility of an eastern interconnection for delivery of power to the San Diego area. The proposed action therefore reflects the CPUC's directive of May 1978, which states that "SDG&E shall continue to analyze and pursue the concept of building a transmission line system to the Arizona border and apply to the appropriate agencies for permits." (CPUC Order Instituting Investigation No. 4.)

DESCRIPTION OF THE PROPOSED ACTION

APS and SDG&E propose to construct a single-circuit 500kV ac electrical transmission line and ancillary facilities between PVNGS Switchyard, approximately 40 miles west of Phoenix, Arizona, and Miguel Substation, approximately 10 miles southeast of San Diego, California, with intermediate terminations near Yuma, Arizona and in the Imperial Valley, California.

The proposed transmission system includes the 500kV transmission line, several lower-voltage transmission lines to interconnect local power networks in Imperial Valley and San Diego, and the upgrading of existing facilities or installation of new facilities at various substation and communication sites in

Arizona and California. Characteristics of the proposed transmission system and ancillary facilities are shown in Tables 3-3(R), 3-4(R) and 3-5(R).

APS would construct the transmission line and ancillary facilities in Arizona, while SDG&E would construct the transmission line and ancillary facilities in California. If approved, the proposed Project is scheduled to begin construction in January 1982 and to be in operation in May 1984. The expected life of the proposed Project is 50 years.

TRANSMISSION LINES

Design

Towers - The transmission-line conductors would be supported by steel free-standing towers for the entire length of both the 500kV and 230kV transmission lines. Design characteristics of the transmission lines and towers are included in Table 3-3(R), and illustrations of typical free-standing towers for the 500kV and 230kV transmission lines are shown in Figures 3-2(R) and 3-3.

A typical tower foundation for the 500kV and 230kV towers would consist of four concrete footings, approximately three feet in diameter and 10 to 15 feet deep, which would be cast in place. (See Figure 3-2(R).)

A dead-end tower would also be required at each end of the transmission line and angle towers at points where the transmission line's angle of deflection exceeds 10 degrees. Both dead-end and angle towers are of the same basic design as free-standing towers, but they are of greater strength with somewhat heavier members and require significantly larger footings. (See Figure 3-3.) In addition, transposition towers would be necessary to balance the phases of the 500kV transmission line but would not be required for the 230kV, 161kV or 69kV transmission lines. A pair of transposition towers would be constructed every 50 to 70 miles throughout the length of the 500kV line. A typical transposition tower is illustrated in Figure 3-3.

Aggregate for concrete would be obtained from pits near work locations. Approximately 20 to 24 cubic yards of aggregate (7 cu yds/tower) would be required per mile of line, or about 6,800 cubic yards of aggregate in total. In addition, approximately 1,000 gallons of water (290 gals/tower) would be required per mile of line for tower footings. For 280 miles of line, approximately 280,000 gallons of water would be required.

Woodpole Structures - Single woodpole structures, as illustrated in Figure 3-2(R), would be used for the proposed 161kV transmission line in the Imperial Valley and the 69kV transmission line in the Yuma area. Structures would be set directly into an augered hole in the ground, approximately eight feet deep, and backfilled.

TABLE 3-3(R)
APS/SDG&E INTERCONNECTION PROJECT
TYPICAL TRANSMISSION LINE DESIGNS

DESCRIPTION	PVNGS to Miguel 500kV LINE	Miguel-Mission Tap 230kV LINE	Imperial Valley 161kV LINE	Yuma 69kV LINE
Line Length (approximate)	283 miles	24 miles	17.5 to 24.2 miles	10 to 56 miles
Type of Structure	steel lattice towers	steel lattice towers	single woodpoles	single woodpoles
Structure Height	80' - 195' 127' average	105' to 155' 120 average	55' to 100' 80' overage	52' to 65" 58.5' overage
Structure Base	38' x 38' (average outside dimension)	32' x 32'	0.75' radius	0.52' radius
Span Length	1,300' to 2,000' 1,600' average	800' to 1,600' 1,250' overage	300' to 400' 350' overage	400' to 460' 430' average
Number of Structures Per Mile	3.3	4.2	15.1	12.3
Transposition Towers ¹	8	Nane	Nane	Nane
Right-of-way Width	200'	Existing ROW	50'	40'
Land Temporarily Disturbed:				
Tower Base	200' x 200' (0.9 acre)	150' x 150' (0.5 acre)	50' x 100' (0.115 acre)	20' x 60' (0.028 acre)
Wire-Pulling Sites	200' x 200' (0.9 acre) per 3 miles	200' x 200' (0.9 acre)	100' x 200' (0.459 acre)	42' x 15' (0.014 acre)
Wire-Splicing Sites	20' x 50' (0.02 acre) per 3 miles	20' x 50' (0.02 acre)	20' x 50' (0.022 acre)	42' x 15' (0.014 acre)
Construction Yards	400' x 540' (5 acres) per 20/30 miles	400' x 540' (5 acres) per 20/30 miles	-0-	-0-
Botch Plants	200' x 218' (1 acre) per 15/20 miles	-0-	-0-	-0-
Land Permanently Required:				
Tower Base	0.0331 acre (1,444 square feet)	0.0235 acre (1,024 square feet)	-0- (1.77 square feet)	-0- 0.85 square foot
Access Roads (acres per mile of transmission line)				
a) New Roads Required	2.97 acres	2.97 acres	1.27 acres	-0-
b) Upgrade Existing Roads	1.27 acres	1.27 acres	-0-	-0-
c) Use Existing Raads	0.42 acre	0.42 acre	0.42 acre	-0-

Table 3-3(R) (continued)
APS/SDG&E Interconnection Project
Typical Transmission Line Design

DESCRIPTION	PVNGS to Miguel 500kV LINE	Miguel-Mission Tap 230kV LINE	Imperial Valley 161kV LINE	Yuma 69kV LINE
Voltage	500,000 volts (500kV) ²	230,000 volts (230kV)	161,000 volts (161kV)	69,000 volts (69kV)
Capacity				
1) Normal rating	1,000-1,200 MW	440 MW	285 MW	108 MW
2) Emergency rating	2,000 MW	440 MW	285 MW	108 MW
Circuit configuration	Single circuit per structure, 2-bundled conductors per phase, horizontal configuration.	Two circuits per structure, single conductor per phase, vertical configuration.	Single circuit per structure, single conductor per phase, delta configuration.	Single circuit per structure, 1 conductor per phase, delta configuration.
Conductor size	2156 kcmil (1.76" dia.)	1033 kcmil (1.21" dia.)	1033 kcmil (1.21" dia.)	795 kcm (1.026" dia.)
Conductor type	ACSR (aluminum conductor, steel reinforced) standard mill finish	ACSR, standard mill finish	ACSR, standard mill finish	All aluminum, standard mill finish
Electric field at edge of ROW	1.5 kV/M	1.5 kV/M	1.5 kV/M	0.04 kV/M
Magnetic field at edge of ROW	.035 gauss	.035 gauss	.035 gauss	0.05 gauss
Electrostatic short-circuit current limit	5 mA	5 mA	5 mA	5 mA
Minimum ground clearance of conductor	32.5' (Arizona) 35.0' (California)	30'	30'	22'

¹Based on approximate transmission-line lengths.

²Design voltage; operating voltage will be 525kV.

Source: APS and SDG&E, 1980.

TABLE 3-4(R)
SUBSTATIONS - CHARACTERISTICS

Item	PVNGS	Yuma ¹	Imperial ² Valley	Miguel ²	Los Coches ³
1. Design voltage levels of new equipment.	500kV	500kV, 69kV	500kV, 230kV, 161kV	500kV, 230kV	230kV
2. Substation to be located at existing switchyard area.	Yes	Yes (at Yucca and Gila) No (at North Gila and Dome Valley)	No	Yes	Yes
3. Expansion required for substation facilities.	None	50 acres	50 acres	50 acres	2 acres
4. Maximum height of structures within substation.	125'	125'	135'	135'	65'
5. Design noise-levels at edge of property.	60 dBA	60 dBA	65 dBA	45 dBA	55 dBA
6. Electric field at substation fence.	1.5kV/M	1.5kV/M	1.5kV/M	1.5kV/M	1.5kV/M
7. Magnetic field at substation fence.	.035 gauss	.035 gauss	.035 gauss	.035 gauss	.035 gauss
8. Electrostatic short-circuit current limit at substation fence.	5 mA	5 mA	5 mA	5 mA	5 mA
9. Major equipment to be installed.	1-500kV PCB 1-500kV SHUNT Reactor INST.	3-500kV PCB 1-500/69kV XFMR 2-500kV SHUNT Reactor INST. 2-500kV Series Capacitor INST. 3-69kV PCB 1-Control House	3-500kV PCB 1-500/230kV XFMR 1-230/161kV XFMR 1-500kV SHUNT Reactor INST. 2-500kV Series Capacitor INST. 2-161kV PCB 2-Control House 3-230kV PCB	1-500kV PCB 1-500/230kV XFMR 9-230kV PCB 1-500kV SHUNT Reactor INST. 2-Control House	9-230kV PCB 2-230/69kV XFMR

Abbreviations:

kV - Kilovolt
PCB - Power Circuit Breaker
XFMR - Transformer(s)
dBA - Decibels on the A scale
INST. - Installation (1 per line terminal)

Notes:

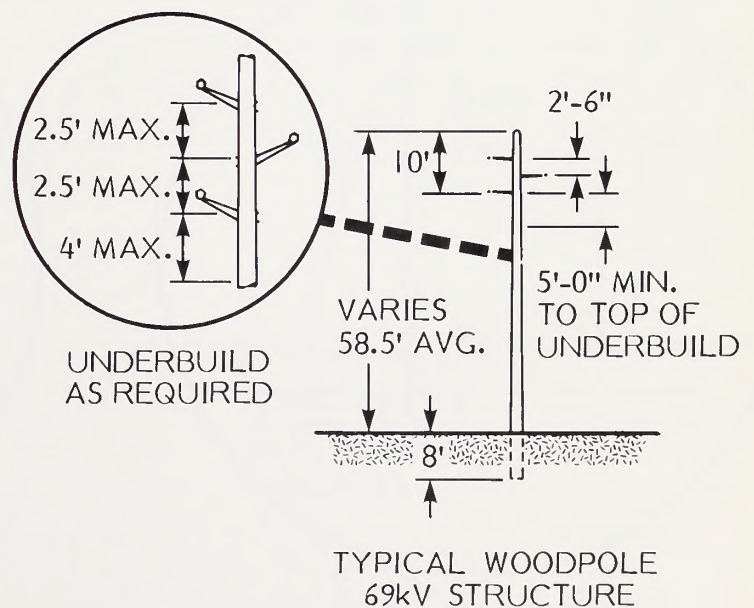
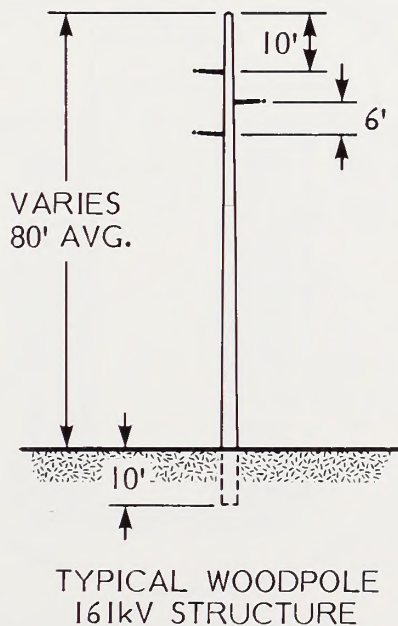
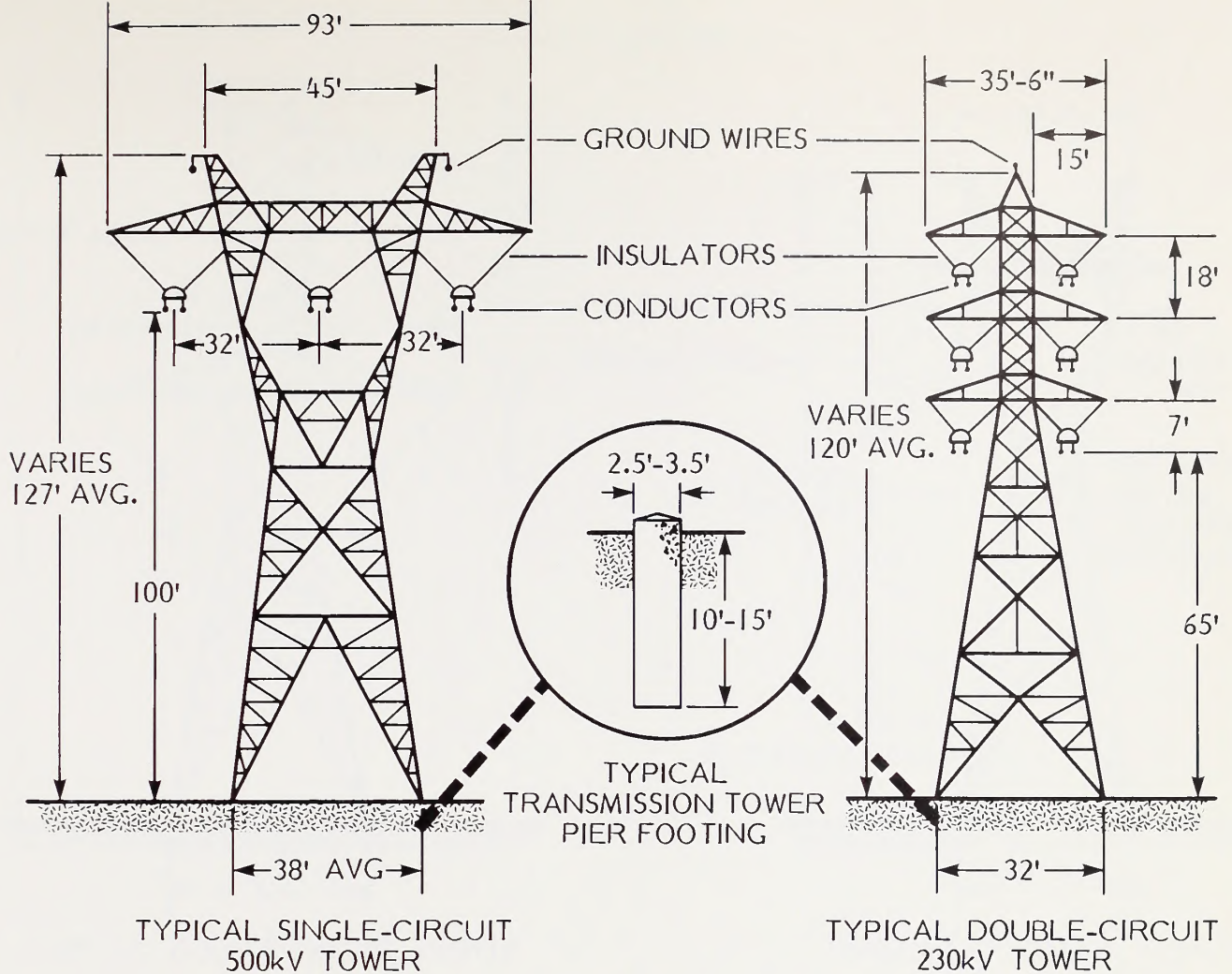
- 1 Only one of the four alternative substations will be built.
- 2 Initially energized at 230kV on 11/83 as a termination for the Miguel-Imperial Valley Line.
- 3 Initially energized at 230kV on 6/83 as a termination for the Los Coches-Mission Top section.

Source: APS and SDG&E, 1980.

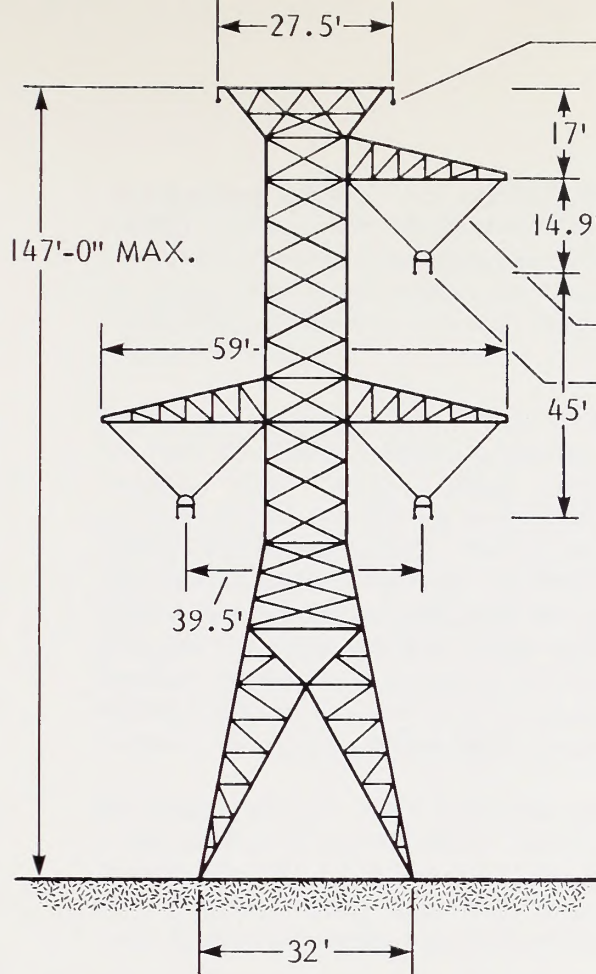
TABLE 3-5(R)
COMMUNICATIONS FACILITIES - CHARACTERISTICS

Communications Facility Name	Existing Comm. Facility Site	New Access Roads Req'd	Approximate Land Req'd for New Equipment	New Equipment House Req'd	New or Higher Comm. Tower Req'd	Approx. New Tower Height (4)
1. El Cajon	Yes	No	None	No	Higher	70'
2. Valley Hi Road (1)	No	No	1 acre	No	New	70'
3. Los Coches (1)	No	No	None	Yes	New	70'
4. San Miguel Mountain (5)	Yes	No	None	Yes	New	50'
5. Mission Control Center (5)	Yes	No	None	No	Existing	Existing
6. Monument Peak	Yes	No	None	Yes	New	150'
7. Superstition Mountain	Yes	No	None	Yes	New	100'
8. Imperial Valley (3)	No	No	5 acres	Yes	New	300'
9. Black Mountain	Yes	No	None	Yes	New	300'
10. East Mesa (2)	No	Yes	5 acres	Yes	New	200'
11. Ogilby (2)	No	Yes	5 acres	Yes	New	250'
12. Yuma (3)	No	No	None	Yes	New	53'
13. Telegraph Pass	Yes	No	None	Yes	New	60'

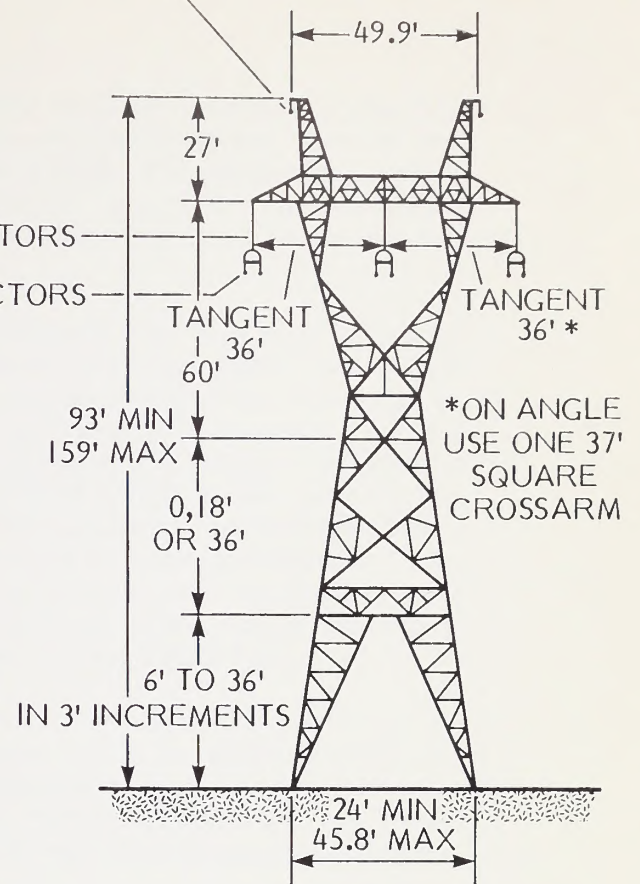
- (1) Existing substation.
(2) Access roads would be improved dirt roads of 300-500 feet in length and 12 feet wide.
(3) Proposed substation.
(4) All towers would be lattice design except for the tower at Yuma which would be steel-pole design.
(5) Added since DES.



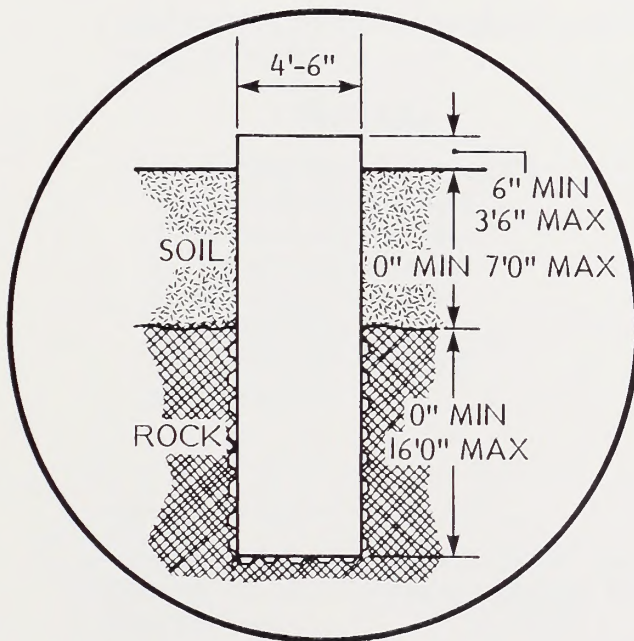
TYPICAL 500/230/161/69 kV STRUCTURE TYPES



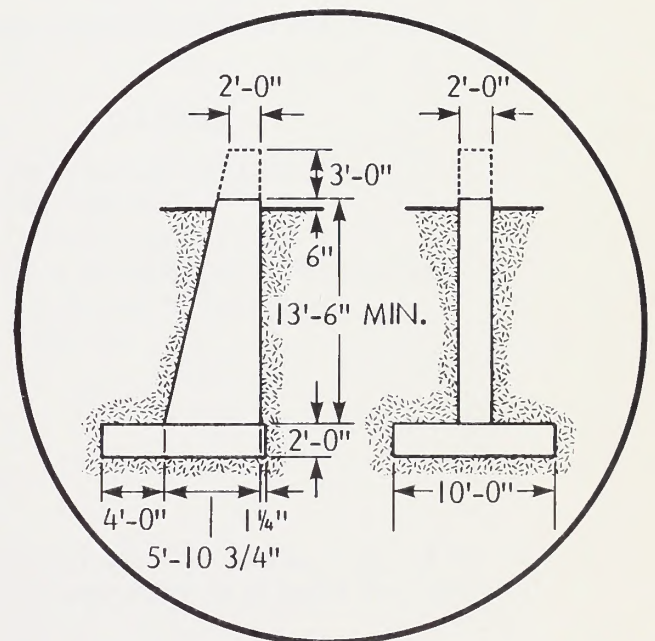
TYPICAL TRANSPOSITION TOWER



TANGENT OR ANGLE TOWER



TYPICAL AUGERED FOOTING



TYPICAL PAD FOOTING

TYPICAL 500kV TRANSPOSITION AND TANGENT TOWER TYPES

Conductors - Electrical conductors provide the medium over which electric energy flows. The conductor size and circuit configuration for each of the proposed transmission lines are shown in Table 3-3(R). The conductors consist of steel reinforced cables surrounded by aluminum strands. The aluminum carries the electrical current; the steel provides tensile strength to support the aluminum strands.

Insulators and Hardware - Two strings of insulators in the form of a "V" would be used to suspend each conductor bundle (phase) from the 500kV and 230kV towers. (See Figure 3-2(R).) Each string would consist of 25 to 30 insulators on each leg of the "V" for the 500kV transmission line and 16 insulators for the 230kV transmission line. The insulators, approximately six inches in height and ten inches wide, would be ceramic. Insulators and all hardware used on the 500kV line would be designed for nearly corona-free operation through 550kV, in order to limit audible noise and interference with radio transmission. To protect phase conductors from direct lightning strikes, two overhead ground wires, 0.385 to 0.5 inch in diameter, would be installed at the top of the 500kV towers. A single ground wire would be required for the 230kV lines.

Insulators for the 161kV transmission line would be the horizontal post-type, as illustrated in Figure 3-2(R). Each post insulator would be approximately six feet in length. Line insulator for the 69kV transmission line would be provided by a tangent epoxy-arm with two 5.75" x 10" standard insulators. A single ground wire would be installed on both the 161kV and 69kV transmission lines.

Construction

Construction of the proposed transmission lines would consist of the following steps: (See Figure 3-4.)

500/230kV

1. Access-road construction
2. Footing installation
3. Structure steel haul
4. Structure assembly
5. Structure erection
6. *Guard pole installation
7. Conductor stringing
8. Cleanup

161/69kV

1. Access-road construction
(as required)
2. Deliver poles
3. *Pole and guard-pole installation
4. Conductor stringing
5. Cleanup

* Guard poles are wooden poles temporarily installed on either side of a highway or other crossings during the stringing operation to prevent the line from falling.

Construction of the proposed 500kV and 230kV transmission lines would involve approximately the number of workers and type of equipment shown in Figures 3-5, 3-6, and 3-7. Construction is expected to take approximately two years. Construction of the proposed 161kV line would require approximately one-fourth the personnel and less equipment than the 500kV line. The 69kV line will require at least one seven-man crew.

Access Roads

Unpaved access-roads would be required for the construction, operation and maintenance of the proposed transmission system. Existing roads would be used where the right-of-way closely parallels a utility corridor or where other existing roads provide easy access to the transmission line. Where existing roads can be used, only spur roads to the tower sites would be required. Main and spur access-roads would be constructed on the right-of-way where existing roads are lacking, unless conditions - such as adverse topography, the need to avoid sensitive resources, potential safety hazards, or requirements of the landowner - dictate otherwise.

All roads would be constructed in accordance with the Applicants' standard specifications for transmission-line access-roads. In the event of a conflict between the Applicants' specifications and the requirements of the Bureau of Land Management (BLM), the States of Arizona and California or other agencies, the requirements of the governing agencies will take precedence. Figure 3-8 illustrates a typical cross-section of an access road.

Main- and spur-road disturbance as shown in Table 3-3(R) are conceptual estimates based on past utility experience. Spur roads for the 500/230/161kV lines are estimated at 0.25 mile per mile of line where adequate main access-roads exist; 0.75 mile per mile of line where existing access-roads must be upgraded; and 1.5 to 2.0 miles per mile of line where all new access-roads are required. For the 161kV line, spur roads are estimated at 0.25 mile per mile of line where adequate access-roads exist, and 0.75 mile per mile of line where all new access-roads are required. Access roads will not be required for the 69kV line as existing roads and rubber-tired vehicles will be used.

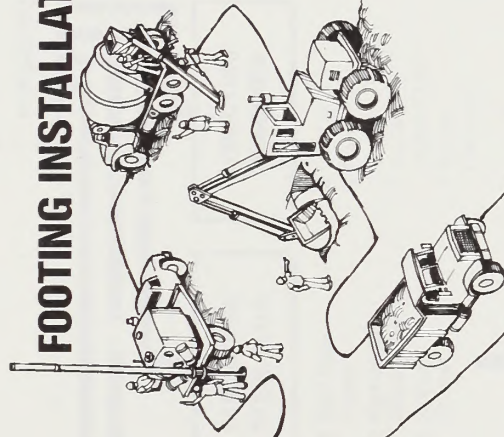
The minimum radius of new or upgraded access-roads would be approximately 100 feet on open curves and 120 feet on blind curves. The maximum road grade would generally be seven percent, but could be increased for distances up to 500 feet.

Roads would be built as near as possible at right angles to the streams and washes. Culverts would be installed where necessary. In addition, road construction would include dust-control measures in sensitive areas. All existing roads would be left in a condition equal to or better than their condition prior to the construction of the transmission lines.

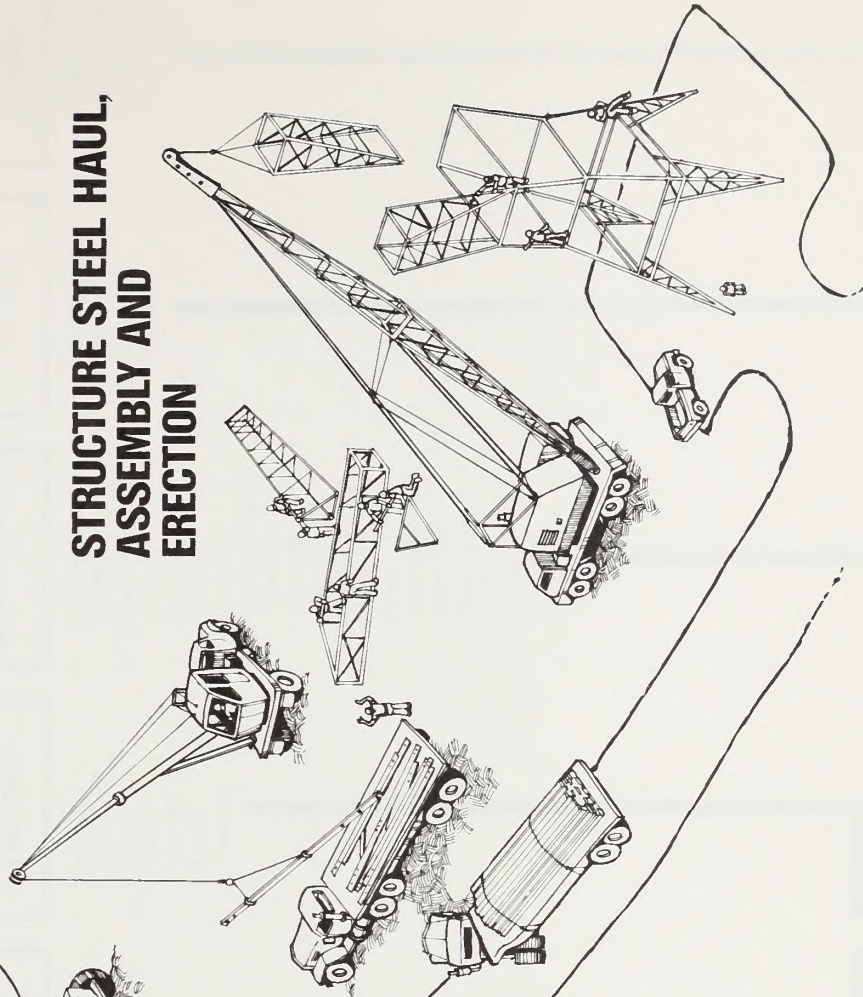
ROAD CONSTRUCTION



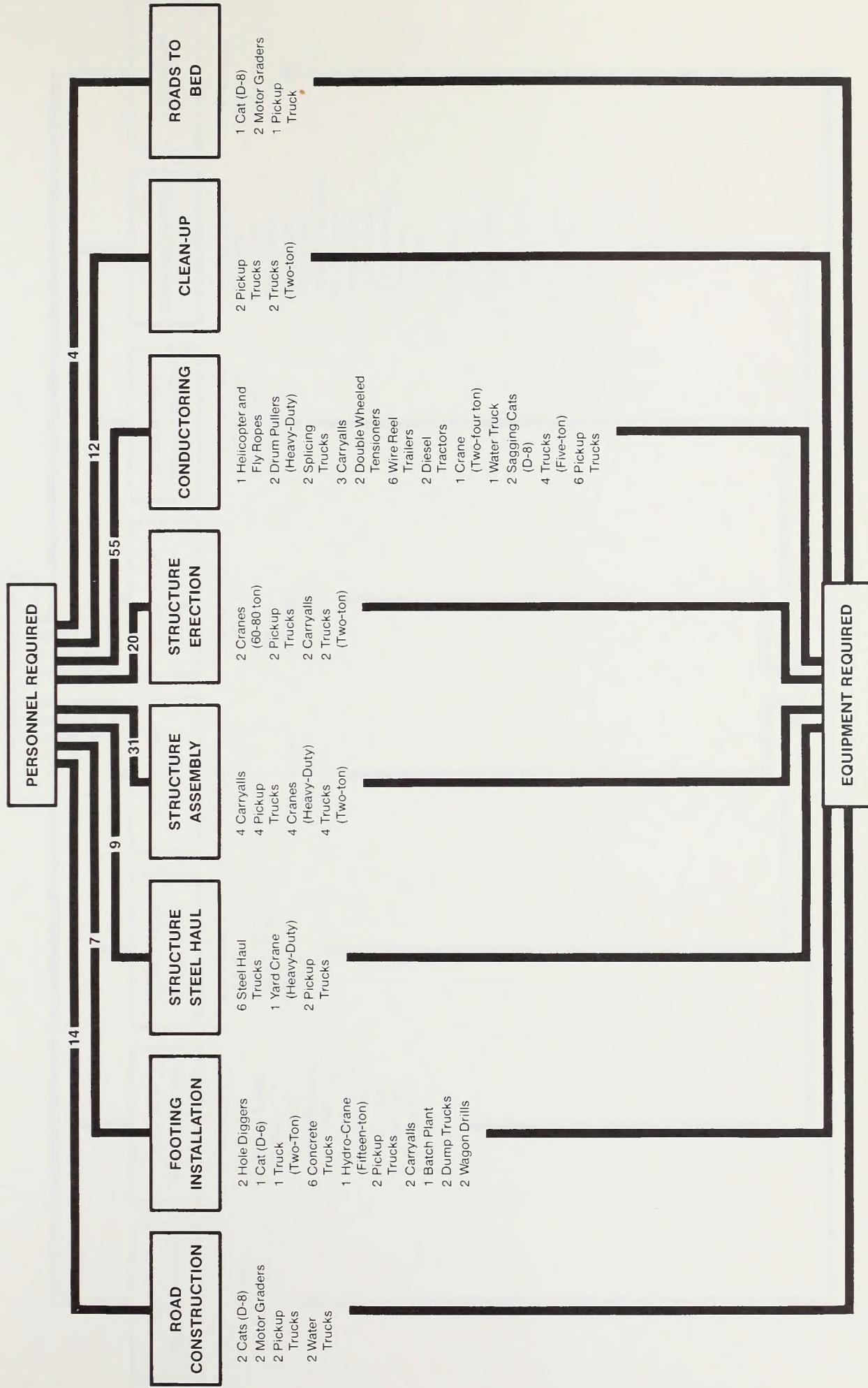
FOOTING INSTALLATION



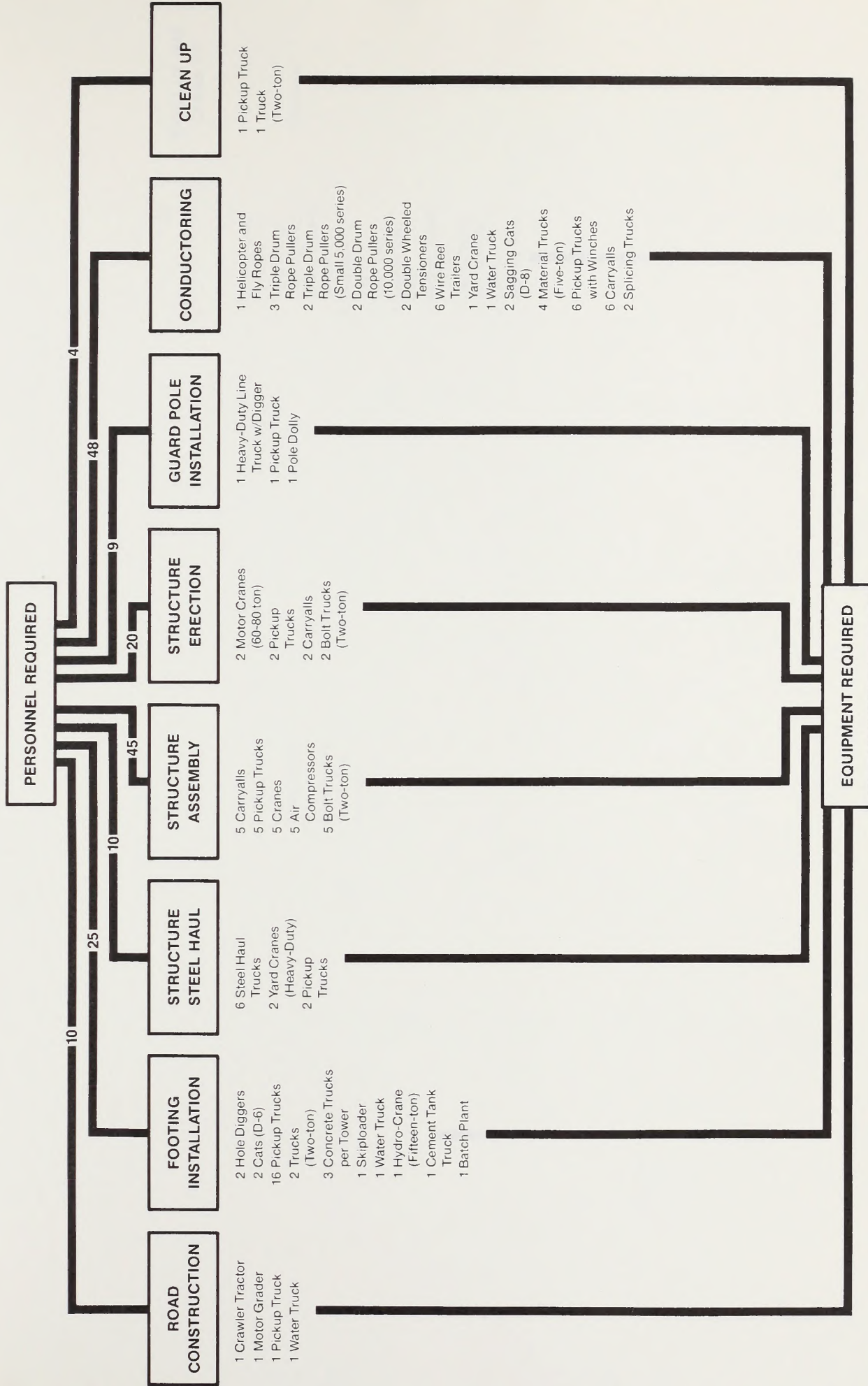
STRUCTURE STEEL HAUL, ASSEMBLY AND ERECTION



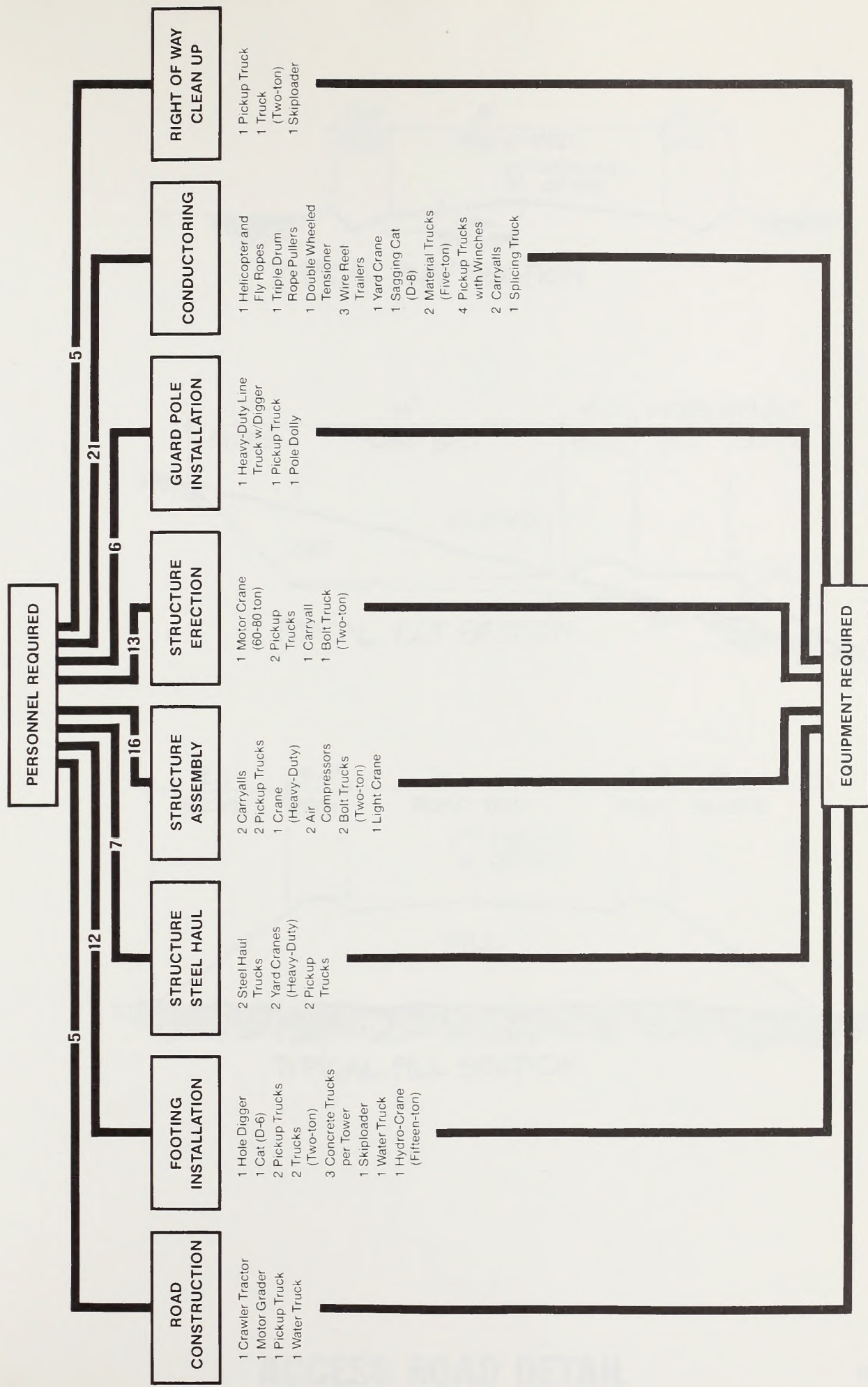
TYPICAL TRANSMISSION LINE CONSTRUCTION ACTIVITIES



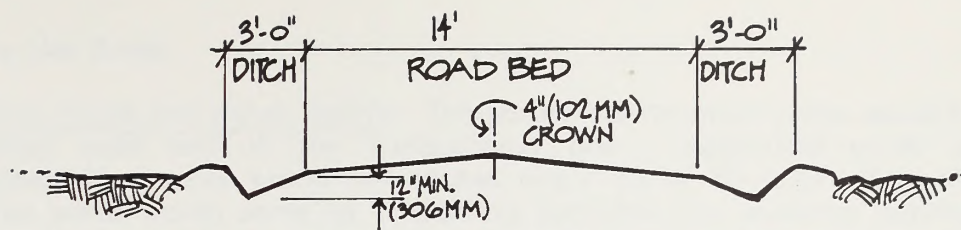
**TRANSMISSION LINE PERSONNEL AND EQUIPMENT
REQUIRED FOR CONSTRUCTION —APS**



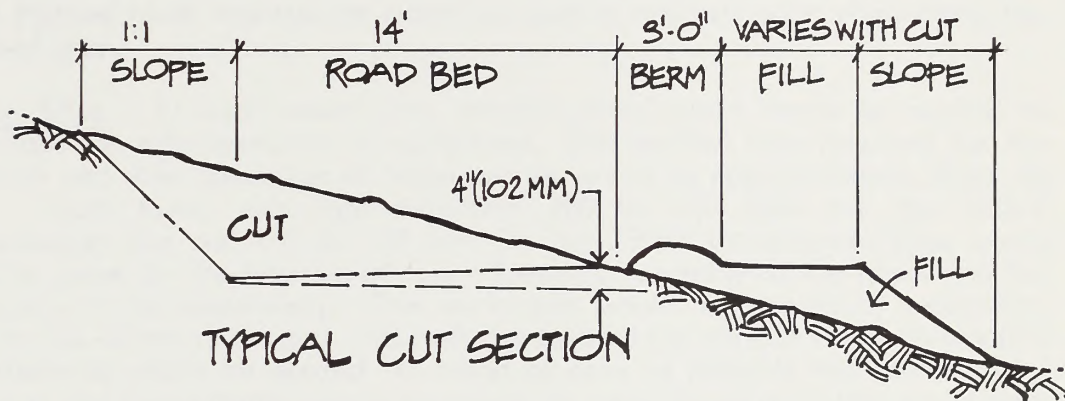
**TRANSMISSION LINE PERSONNEL AND EQUIPMENT
REQUIRED FOR CONSTRUCTION — SDG&E**



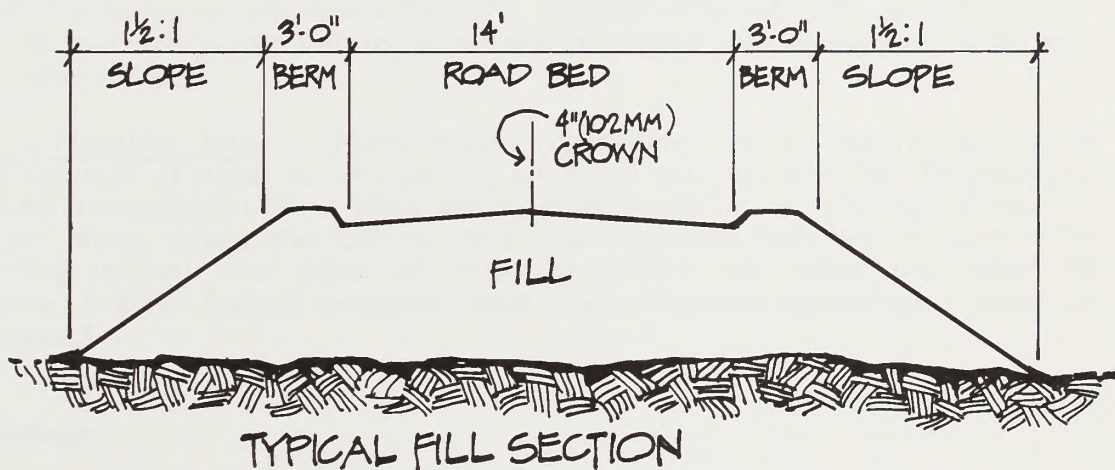
TRANSMISSION LINE PERSONNEL AND EQUIPMENT REQUIRED FOR CONSTRUCTION (230 kV) — SDG&E



TYPICAL FLAT SECTION



TYPICAL CUT SECTION



TYPICAL FILL SECTION

ACCESS ROAD DETAIL

Figure 3-8

Temporary Use Areas

Construction Yards and Batch Plants - Temporary construction yards would be located near each end of the transmission line. Additional yards of approximately five acres would be located every 20 to 30 miles along the route. The yards would serve as reporting locations for workers, parking space for vehicles and equipment, sites for material storage, and stations for equipment maintenance. Facilities would be fenced and their gates locked. Security guards would be stationed where needed.

A portable concrete batch-plant occupying approximately one acre would be located every 15 to 20 miles for use in constructing foundations. A rubber-tired flatbed truck and tractor would be used to relocate each plant along the right-of-way.

Tower Sites - At each tower site, leveled areas (pads) would be needed to facilitate the safe operation of equipment. The leveled area required for the location and safe operation of large cranes would be approximately 30 by 40 feet. Each tower site, approximately 200 by 200 feet for the 500kV transmission line and 150 by 150 feet for the 230kV transmission line, would provide space for the location of tower footings, assembly of the tower and the necessary crane maneuvers. The work area would be cleared of vegetation only to the extent necessary. All pads not needed for normal transmission-line maintenance would be graded to blend as near as possible with the natural contours and revegetated where required. In agricultural and other areas near tower sites, maximum use would be made of existing roads.

Pole Sites - At each 161kV pole site an area 50 feet by 100 feet will be required to lay out and frame the pole. At each 69kV pole site, an area 20 feet by 60 feet will be required to lay out and frame the pole where the line follows existing roads.

Wire-Handling Sites - Wire-handling operations would require temporary disturbance of areas as wire-pulling sites and splicing sites for the proposed 500kV transmission line. Wire-pulling sites would be required approximately every three miles, and splicing sites approximately half-way between each pulling station. The sizes of these temporary use areas are noted in Table 3-3(R). Typical equipment used in wire-handling operations is shown in Figure 3-9.

Cleanup

Construction sites, material storage yards and access roads would be kept in an orderly appearance and free of rubbish and waste materials. Excess crankcase oil, or other petroleum products, would be hauled away to approved sites, and no oil or other chemicals would be released into streams or stream beds. On completion of construction, storage and construction areas would be cleaned and restored as near as possible to their original conditions. All rubbish and waste materials would be hauled away and disposed of at approved sites.

Use of Chemicals, Retardants, Biocides

Rights-of-way would not be chemically treated unless necessary to comply with the permit requirements of public agencies.

Fire Protection Plan

There would be full compliance with applicable fire laws and regulations. During construction of the transmission line in areas where fire hazards exist, all vehicles and gasoline-powered equipment would be equipped with spark arrestors. All welding and grinding operations and smoking privileges would be restricted to specially designated areas. The Applicants would establish a Project fire plan approved by appropriate agencies, and all Project personnel would be instructed as to their individual responsibility under the plan.

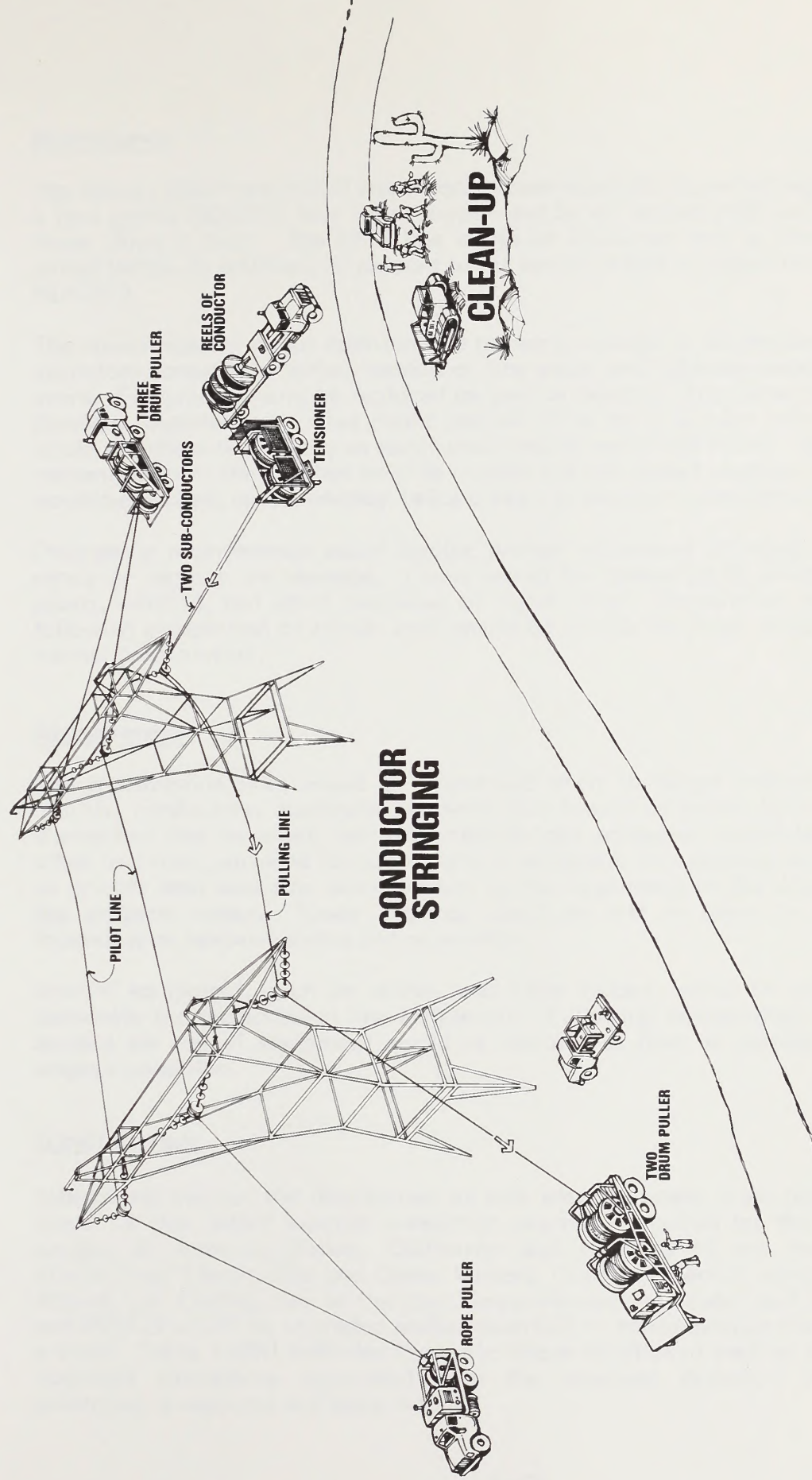
Operation

Operational Characteristics

Generally, 500kV system voltage may vary from 500kV to 550kV, but the system normally operates at a "nominal voltage" of 525kV. The transmission line would also be designed to limit audible noise at the edge of the rights-of-way to less than 33 dBA during fair weather and 57 dBA during foul weather. The 161kV and 69kV transmission lines would be designed to limit audible noise at the edge of the right-of-way to less than 30 dBA and 0 dBA, respectively, during fair weather and 32 dBA and 1 dBA, respectively, during foul weather. The transmission line design would further provide for limiting electric and magnetic fields at the edge of the right-of-way, and short-circuit current from a conductive object to values shown on Table 3-3(R).

Utilization of the Right-of-Way

After the transmission line has been energized, a number of compatible land uses may be permitted within the right-of-way, such as agriculture, equestrian and hiking trails, green-belt areas, golf courses or parks. Permission to use the transmission line right-of-way on private lands would have to be obtained from the utility. Incompatible land uses within the right-of-way include construction and maintenance of inhabited dwellings, well-drilling, and any use requiring changes in surface elevation that would affect existing or planned facilities. Land uses complying with local requirements would be permitted adjacent to the right-of-way. Compatible uses of the right-of-way on public lands would have to be approved by the appropriate agency.



BASIC WIRE-HANDLING EQUIPMENT

Figure 3-9

Maintenance

The 500kV, 230kV and 161kV transmission lines would be inspected regularly by a land patrol (SDG&E) four times a year and by air patrol (APS and SDG&E) three times a year. The 69kV line would be inspected once a year by land patrol (APS). In addition, 20 percent of all towers would be inspected annually (SDG&E).

The nonemergency major maintenance necessary would be the replacement of insulators damaged by either vandals or line surge and lightning-induced flash-overs. Equipment would be replaced as soon as possible after detection of the damage. Maintenance crews might consist of as many as nine members and would require a tool truck, an assist truck and an aerial lift truck. Because of contaminants in the air that exist in coastal but not desert regions, insulators would be washed, approximately twice a year, in coastal regions only.

Emergency maintenance would involve prompt movement of repair crews to repair or replace any damage. Crews would be instructed to protect crops, plants, wildlife, and other resources of significance. Restoration procedures following completion of repair work would be similar to those prescribed for normal construction.

Abandonment

The transmission lines would be abandoned when no longer needed. Subsequently, conductors, insulators, hardware and towers on public land would be dismantled and removed, and all materials and equipment would be used on other facilities, salvaged for spare parts or scrapped. Dismantling and removal on private land would be accomplished by the Applicants at the discretion of the property-owner. Tower footings would be left in place or removed, depending on land-use status and ownership.

Special equipment, such as cranes and large trucks, would be required to dismantle the transmission line efficiently. Following dismantling, the areas leveled for use of equipment would be restored as near as possible to their original condition.

SUBSTATIONS

Substations control the distribution of bulk electric power from transmission lines. A new 500kV electric substation would be required for the proposed system at Imperial Valley, California and for two of the four Yuma alternatives (North Gila and Dome Valley). Existing electric substations at Miguel, Los Coches, two of the four Yuma alternatives (Yucca and Gila sites) and PVNGS would be upgraded and/or modified to accommodate the proposed system. Table 3-4(R) indicates the basic characteristics of each of the new or upgraded substations associated with the proposed system. A typical substation is depicted in Figure 3-10(R).

Construction

Construction work at PVNGS, Yuma, Imperial Valley, Miguel and Los Coches substations would consist of the following steps:

1. Access-road construction
2. Site grading
3. Site fencing
4. Footing installation
5. Equipment installation
6. Landscaping and cleanup

As noted in Table 3-4(R), no additional site work would be required at PVNGS Substation, and only minimal grading would be necessary at Los Coches Substation. Substation construction would last from one to two years. Between 35 and 50 workers would be required to complete construction of the new substations, which would also require grading and compaction equipment, concrete trucks, material hauling vehicles and cranes.

Operation

Electric substations associated with the proposed Project would be unmanned and operated automatically. Electric equipment within the substation would be controlled in the utility's central operations facility. High-voltage electric equipment within a 500kV substation normally operates at approximately 525kV. The substation equipment and facility layout would be designed to limit radio and television interference, audible noise, magnetic and electrical fields to values indicated on Table 3-4(R).

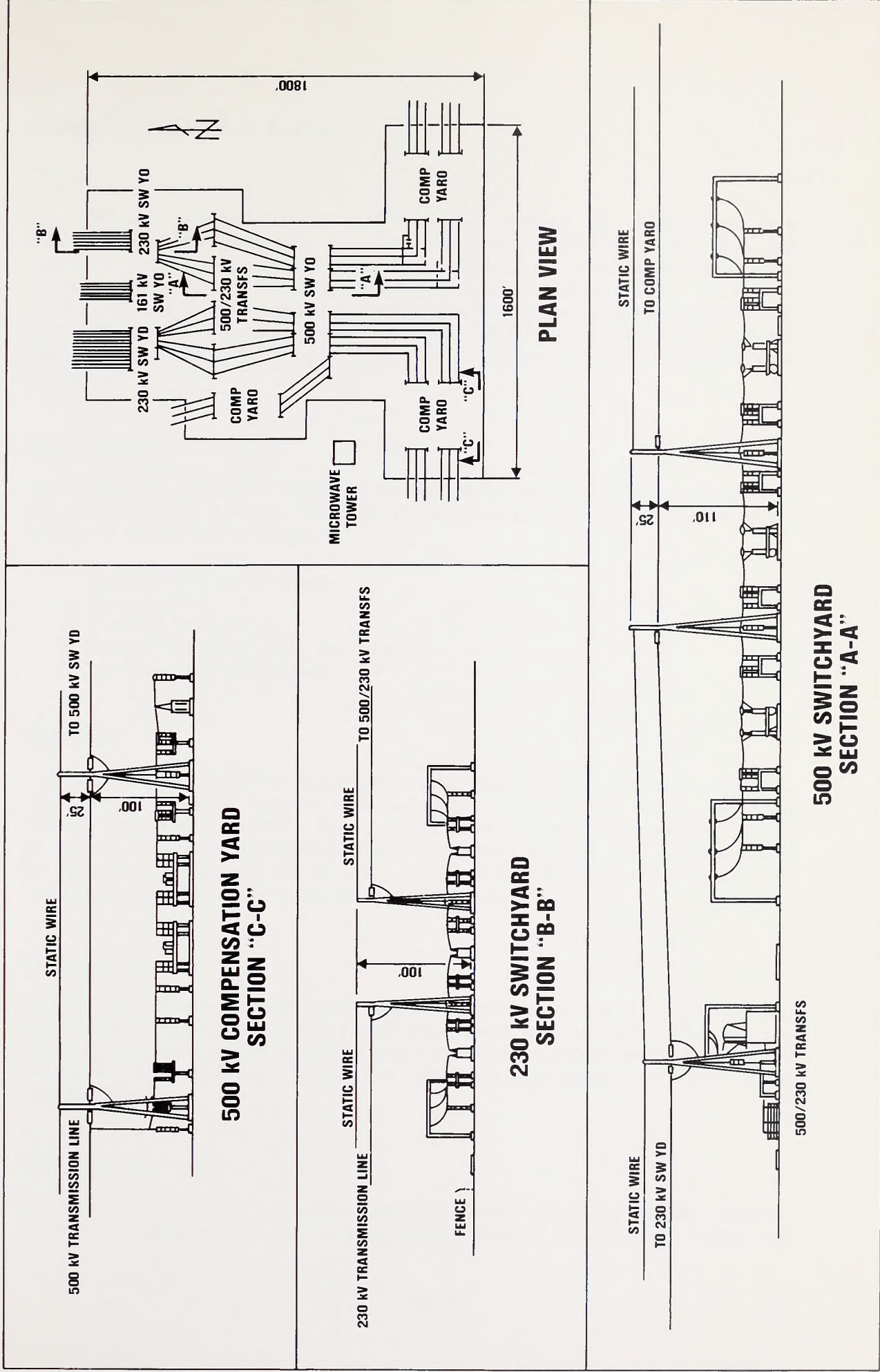
All substations would be fenced, locked and secured. Entry would be restricted to appropriate utility personnel.

Maintenance

Maintenance would include equipment testing, and routine and emergency procedures. Overhaul of major equipment would be routine. Emergency maintenance would take place only when equipment is damaged or inoperable.

Abandonment

The facilities would be abandoned when no longer needed. Subsequent dismantling and removal would depend on land-use status and ownership. Following dismantling and removal of equipment, the area at each site would be restored as near as possible to its original condition.



TYPICAL 500/230/161/69 kV SUBSTATION

COMMUNICATION FACILITIES

Design

The proposed communications system would require the addition of new facilities and the upgrading of several existing facilities. The new and upgraded facilities would be required to provide an intertie of microwave systems among APS, SDG&E and Imperial Irrigation District (IID). Communication services to be provided include protective relaying, system dispatching and system monitoring and control. Table 3-5(R) indicates pertinent data for each of the proposed facilities. Figure 3-11 illustrates typical communications facilities.

Construction

Approximately eight men would be needed during peak construction periods at any site requiring a new building or tower. Construction at each site would consist of the following steps.

1. Access-road construction
2. Site grading
3. Footing installation
4. Equipment installation and fencing
5. Landscaping and cleanup

Operation

Communications facilities associated with the proposed Project would be unmanned and would operate automatically. The control house would be fenced, locked and secured. Entry would be restricted to appropriate utility personnel. The maximum microwave transmitter power at each facility would be 20 watts. However, due to the concentrating effect of the antenna, the transmitted power would typically be one kilowatt.

Maintenance

Maintenance of the proposed communication facilities would consist of testing, repair and replacement of electronic equipment located within the control room at the communication site. Inspection and maintenance of tower guy-wires, the communication tower and other physical equipment would occur periodically.

Abandonment

Communication facilities would be abandoned when no longer needed. Subsequent dismantling and removal would depend on land-use status and

ownership. Following dismantling and removal of equipment, the area at each site would be restored as near as possible to its original condition.

SCHEDULE AND BUDGET

Construction and operation scheduling for the proposed Project are shown in Table 3-6(R). A summary of estimated costs for the construction of the proposed Project is shown in Table 3-7(R).

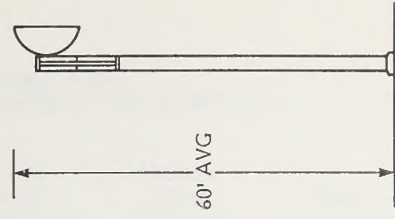
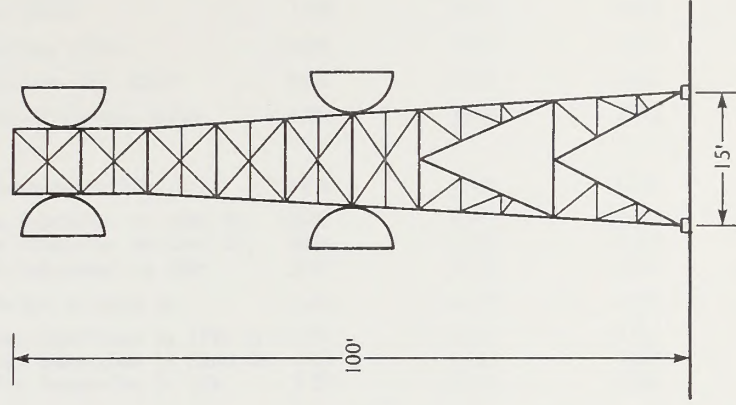
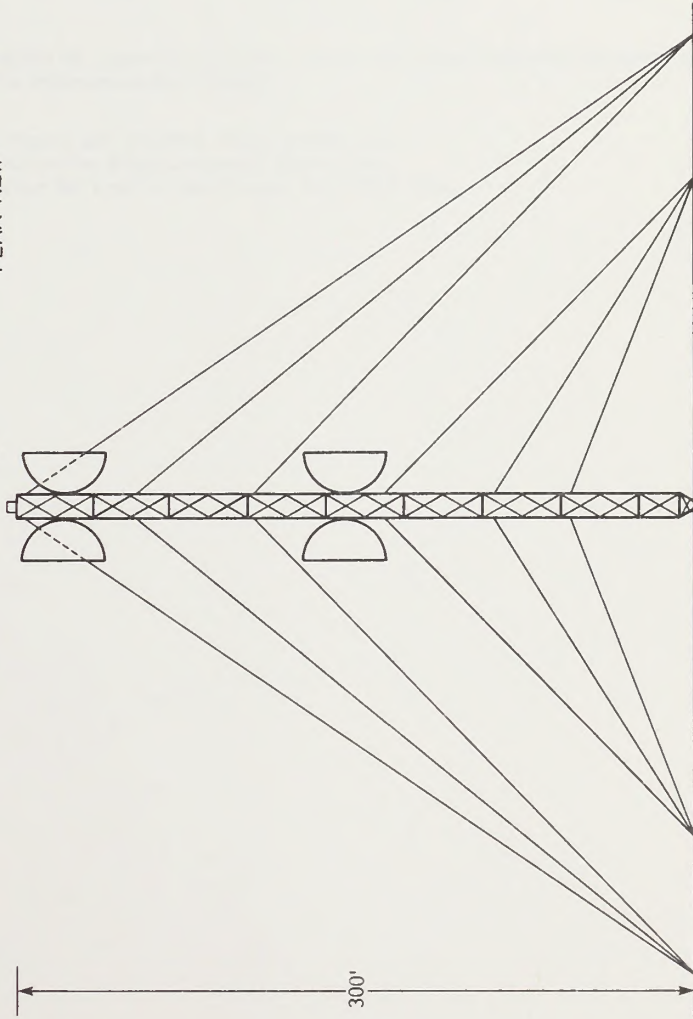
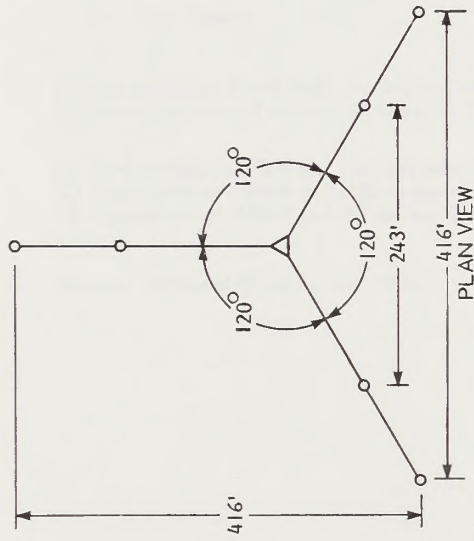
ROUTING ALTERNATIVES

In order to facilitate description of the routing alternatives, the overall routing network was organized into subdivisions representing localized routing options. The subdivisions of routing options were called "sets." Within each set a combination of contiguous links constitutes a "route" that shares common beginning and end points with other routes in the same set. Each set of routes represents a routing decision-point within the overall routing network.

Although all links are integral to the entire routing network, some links are not part of any primary decision set, but serve to connect sets. Such links are called "connectors." Routes and links constituting routes are identified by Arabic numerals; sets by Roman numerals and geographic location; and connectors by upper-case letters of the alphabet (e.g., Set I - Palo Verde/Gila Bend Mountains, Route 2, Links 2, 3, 4, 6 and Connector A, Links 2, 8).

Prior to the publication of the DES in August 1980, the preliminary alternative routes identified were composed of the following links:

	<u>Arizona</u>		<u>California</u>
Links	1-24 25a, 25b 26-29 30a, 30b 31a, 31b 32a, 32b 33-39 40a, 40b 41-71 73a, 73b, 73c 74	Links	101-154



TYPICAL COMMUNICATIONS FACILITIES

Figure 3-11

TABLE 3-6(R)
PROPOSED CONSTRUCTION SCHEDULE

	<u>Begin Land Acquisition</u>	<u>Procure Major Equipment</u>	<u>Begin Construction</u>	<u>Operation</u>
Transmission Lines:	Prior to:	Prior to:		
A. PVNGS-Miguel 500kV	7/82	8/83	4/82	5/84 ⁽¹⁾
B. Miguel-Las Caches 230kV	N/A	8/83	6/83	5/84
C. Las Caches-Mission Tap 230kV	N/A	8/82	6/82	6/83
D. Imperial Valley-El Centro 161kV	4/81	6/82	2/83	11/83
E. Yuma 69kV				
a. Yucca Substation to 32nd St.	N/A	6/84	1/85	5/85
b. North Gila Substation to 10th St.	12/81	6/83	12/83	5/84
North Gila Substation to 32nd St.	8/81	2/83	8/83	5/84
North Gila Substation to Gila	3/82	9/83	3/84	5/84
c. Gila Substation to 32nd St.	1/82	6/83	1/84	5/84
d. Dame Valley Substation to 10th St.	11/81	5/83	11/83	5/84
Dame Valley Substation to 32nd St.	7/81	1/83	7/83	5/84
Dame Valley Substation to Gila	3/82	9/83	3/84	5/84
Substations:				
A. PVNGS	N/A	10/83	8/83	5/84
B. Yuma	4/81	8/83	4/83	5/84
C. Imperial Valley	4/81	10/82	3/82	5/84
D. Miguel	11/80	11/82	4/82	5/84 ⁽²⁾
E. Las Caches	N/A	3/83	1/82	5/84 ⁽³⁾

Communications Facilities: Various schedules for separate facilities. In-service dates established to correspond with energization of various sections of the Interconnection Project.

(1) Energized at 230kV in 11/83 between Miguel and Imperial Valley substations.

(2) Energized at 230kV in 11/83 as termination for Miguel-Imperial Valley line.

(3) Energized at 230kV in 6/83 as termination for Las Caches-Mission Tap 230kV line.

Source: APS and SDG&E, July 1980.

TABLE 3-7(R)
APS/SDG&E INTERCONNECTION PROJECT
SUMMARY OF ESTIMATED COSTS

Description	Cost (\$x1000) Southern Route	Cost (\$x1000) Southern Route (Escalated)	Cost (\$x1000) Northern Route	Cost (\$x1000) Northern Route (Escalated)
1. 500kV transmission line ^(A)				
PVNGS to Yuma	\$ 31,076	\$ 45,082	\$ 31,076	\$ 45,682
Yuma (Arizona Southern)	10,418	15,314	-	-
Yuma (Arizona Northern)	-	-	4,965	7,299
Yuma (California Southern)	3,074	4,519	-	-
Yuma (California Northern)	-	-	4,283	6,296
Sond Hills to Miguel	45,063	66,243	45,063	66,243
2. 230kV transmission line ^(A)				
Miguel to Mission Tap	9,019	13,256	9,019	13,258
3. 161kV transmission line ^(A)				
Imperial Valley to El Centro	3,780	5,557	3,780	5,557
4. 69kV transmission line ^(A)				
Gila Alternatives	1,114	1,638	-	-
North Gilo Alternatives	-	-	2,711	3,985
5. PVNGS Switchyard ^(A)	4,215	6,196	4,215	6,196
6. Yuma Substation ^(A)				
Gilo Substation	13,645	20,058	-	-
North Gilo Substation	-	-	15,254	22,423
7. Imperial Valley Substation ^(B)	-	46,253	-	46,253
8. Miguel Substation ^(B)	-	38,148	-	38,148
9. Los Coches Substation ^(B)	-	16,436	-	16,436
10. Communication Facilities ^(B)				
Arizona ^(A)	-	438	-	438
California ^(B)	-	2,255	-	2,255
11. Land				
Arizona	5,125	7,534	2,004	2,940
California	-	24,600	-	27,100
TOTAL		\$ 313,527		\$ 310,515

A. Cost based on 1979 dollars; then escalated to 1984 at an overage rate of 8 percent per year. Escalation factor 1.47.

B. Cost represents escalated dollars based on year of expenditure from 1979 through 1984.

Source: APS and SDG&E, 1980 and 1981.

As a result of Phase II studies, the following links were eliminated:

<u>Arizona</u>		<u>California</u>	
Links	11, 15, 17, 18, 24, 27, 32a, 47, 48,49, 50, 51, 52, 53, 54, 55, 58, 64, 71, 72	Links	101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 117, 118, 119, 120, 121, 122, 131, 137, 139, 152, 153, 154

(See Figure 3-12 and pages 3-30 through 3-32 in the DES for a discussion.)

The final alternative routes were organized into sets and connectors for comparison and identification of the environmentally preferred route. (See Table 3-8 and Figure 3-14 in the DES.)

Subsequent to the publication of the DES - and as a result of public comment, agency review and additional study - the following links eliminated from the DES final routes were reinstated (see Figure 2-3(R)):

<u>Arizona</u>		<u>California</u>	
Links	47,48,49,50 (sub- divided into 50a and 50b), 51,52 (subdivided into 52a and 52b), 53 (sub- divided into 53a,53b, 53c), 55,71	Links	101,103,104,105,106, 107,108,110 (subdivided into 110a,110b),111,117 (subdivided into 117a,117b) 119,120,121 (subdivided into 121a,121b),122,154

Also, new links were added (see Figure 2-3(R)).

<u>Arizona</u>		<u>California</u>	
Links	76-86	Links	126A,155-166

In addition, the following links were subdivided (see Figure 2-3(R)):

<u>Arizona</u>		<u>California</u>	
Links	74 (74a, 74b)	Links	123(123a,123b); 124 (124a, 124b); 128 (128a,128b,128c); 132 (132a, 132b); 145 (145a,145b,145c, 145d); 146 (146a,146b)

Links 69 and 123a (which crosses the Quechan Indian Reservation) were eliminated prior to SDES route evaluation because Link 123a was not part of the right-of-way negotiated with the Quechan Tribal Council, and Link 69 could not be utilized without Link 123a.

Routes Evaluated for the SDES Routing Comparison

Routing alternatives for Yuma, the Sand Hills, the Imperial Valley (East Mesa) and Dulzura were reevaluated through Phase II studies. Other routing alternatives for the Sand Hills and Dulzura were reevaluated through feasibility/suitability studies, and subsequently eliminated (see Appendix G for discussion).

Three key elements were considered in identifying and evaluating alternative routes for the SDES: the project description, including changes since the DES; potential cumulative environmental impacts; and public concerns expressed in hearings and letters in response to the environmentally preferred route identified in the DES. As a result, 34 links in the Yuma area and one link in the Imperial Valley were eliminated from the combined total of 100 links studied for the SDES. Table 3-8a and Figure 3-12(R) present a summary of link elimination data.

Alternative Ancillary Facility Locations Eliminated Since the DES

Because new 161kV corridor locations were provided by the Imperial Irrigation District (IID), the 161kV corridors (Links B and D) were eliminated. In addition, two microwave sites (Escondido and Volcan) were eliminated after SDG&E identified existing facilities as replacements.

Organization of Final Routes and Ancillary Facilities

It is important to note that since valid objections were raised to only five sections of the DES environmentally preferred route (Yuma, Imperial Valley, Sand Hills, Dulzura, Miguel-Mission Tap), new studies and reevaluations of existing data were conducted only for these areas. The remaining portions of the DES environmentally preferred route were not restudied and therefore are not included in route comparisons in the SDES.

In sections of the environmentally preferred route that were restudied, the routing network was reorganized to accommodate new and revised alternatives and facilitate their comparison. In some cases, new sets were created from combining portions of old sets, and many are, accordingly, renumbered.

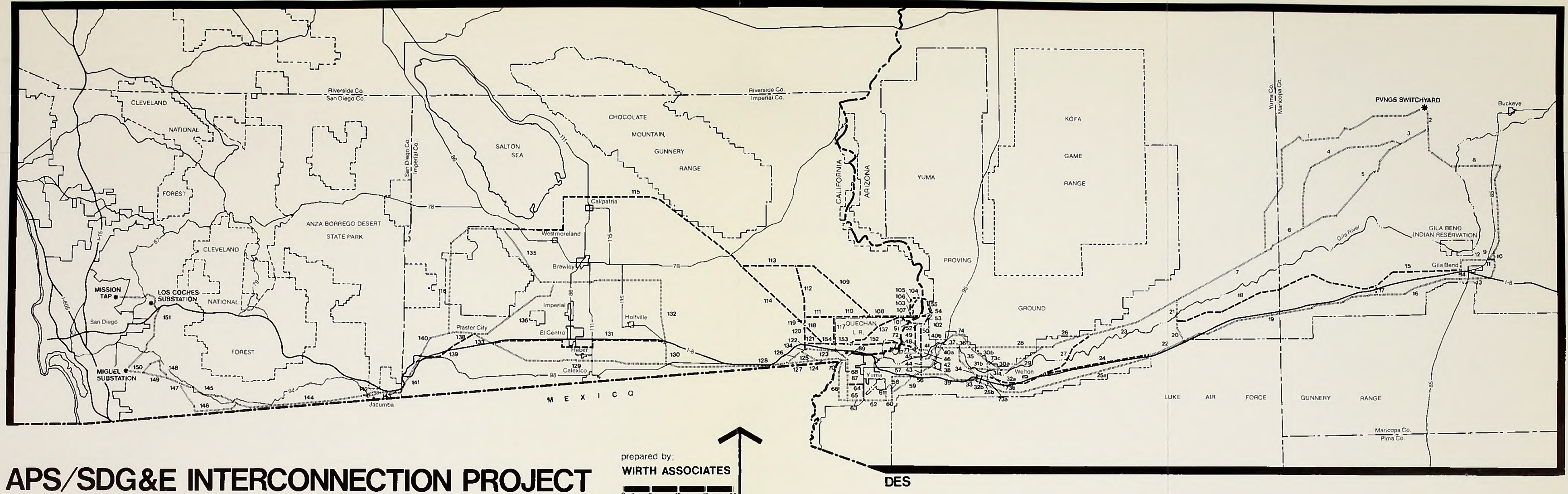
TABLE 3-8a
***SDES LINK ELIMINATION**

Yuma Total Links Evaluated for SDES			Links Eliminated		Final Links	
36	60	106	42	84	36	68
37	62	107	47	85	37	70
38	63	108	50a	103	38	78
40a	65	110a	50b	104	40a	81
40b	67	110b	52a	105	40b	82
41	68	111	53a	106	41	86
42	70	117a	53b	107	43	101
43	71	117b	53c	110b	44	108
44	74a	119	55	111	45	110a
45	74b	120	71	117a	46	117b
46	76	121a	74a	119	48	124a
47	77	121b	74b	120	49	124b
48	78	122	76	121a	51	125
49	79	123b	77	121b	52b	134
50a	80	124a	79	122	56	160
50b	81	124b	80	123b	59	161
51	82	125	83	154	60	162
52a	83	134			62	163
52b	84	154			63	164
53a	85	160			65	165
53b	86	161			67	
53c	101	162				
55	103	163				
56	104	164				
59	105	165				

* See discussion of Route-Elimination Rationale in Appendix G.

Table 3-8a (continued)
 *SDES Link Elimination

<u>Imperial Valley</u> Total Links Evaluated for SDES	Links Eliminated	Final Links
116		116
128c		128c
129		129
130		130
132a		132 (a and b)
132b		
133		133
135		135
136		136
138	166	138
166		
<u>Sand Hills</u>		
126		126
126A		126A
128a		128a
<u>Dulzura</u>		
145a		145a
145b		145b
145c		145c
145d		145d
146a		146a
146b		146b
155		155
156		156
157		157
158		158
159		159



LINKS ELIMINATED

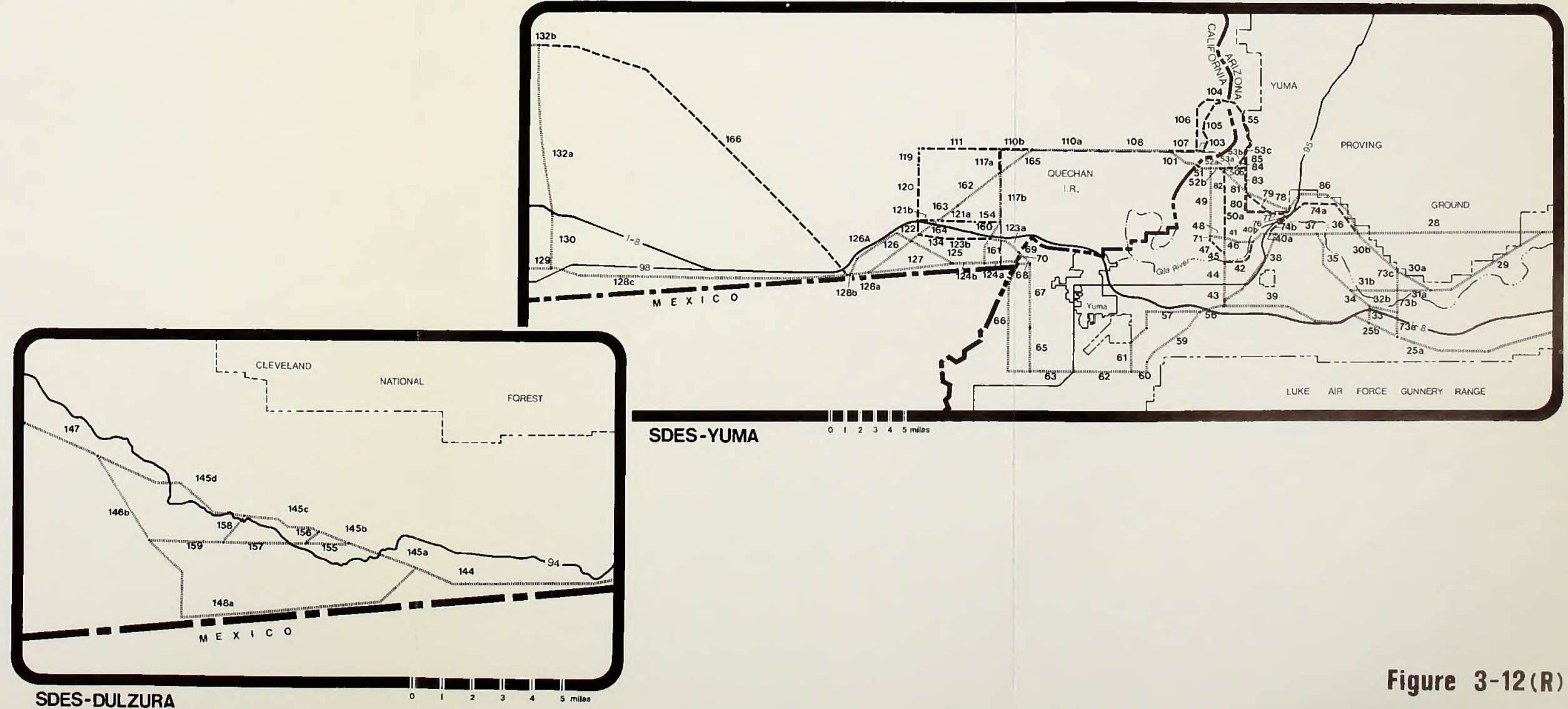


Figure 3-12(R)

Table 3-8b and Figure 3-13(R) present the final ancillary facilities evaluated in the route-selection process according to geographical area.

1. Yuma substations and associated 69kV transmission systems.
2. Imperial Valley and associated 161kV transmission systems.

Figure 3-14(R) and Table 3-8c show all sets and connectors of SDES final routing alternatives.

COMPARISON

A summary comparison of environmental impacts and costs associated with each routing alternative for SDES sets and connectors is provided in Table 3-9(R), and the basis for these comparisons is briefly described below. A similar comparison for DES sets and connectors (Table 3-9) can be found in Appendix G. It should be noted that because of the complexity of the routing network in the Yuma area, a two-stage process was used to evaluate alternatives, which is described in Appendix G.

Environmental Comparison

The environmental comparison displayed on Table 3-9(R) shows five types of data for each routing alternative.

- Impact characterization.
- Significant adverse unavoidable impacts.
- Routing preference by resource category.
- Agency/public comments.
- Summary statement and identification of environmentally preferred route.

A brief description of the above data types follows:

Impact Characterization

The environmentally preferred route should minimize overall impact to the environment.

Chapter 5 presents the impact assessment and mitigation planning process, committed mitigation plans (Tables 5-1, 5-2 and 5-3(A)) and potential Project impacts remaining after application of mitigation (Table 5-4(A)). In order to summarize impact data into a more readily comparable form for decision-making, the specific impacts of each routing alternative were characterized

as shown on Table 5-4(A), over the entire route. Generalized impact-level descriptions used to characterize each route for each resource category are as follows:

- High (H) impact - Route predominantly consists of high impact concerns.
- High-to-Moderate (H-M) impact - Route predominantly consists of high impact concerns ranging toward moderate.
- Moderate-to-High (M-H) impact - Route predominantly consists of moderate impact concerns ranging toward high.
- Moderate (M) impact - Route predominantly consists of moderate impact concerns.
- Moderate-to-Low (M-L) - Route predominantly consists of moderate impact concerns ranging toward low.
- Low-to-Moderate (L-M) impact - Route predominantly consists of low impact concerns ranging toward moderate.
- Low (L) impact - Route predominantly consists of low impact concerns.

Criteria used in characterizing impacts were:

- The dominant impact-level among combinations of high-, moderate-and/or low-level impacts, for example:
 - If the route has mostly low impacts, with a few moderate impacts, it would be characterized as low-to-moderate; or
 - If the route has entirely low or almost entirely low impacts, with a small amount of moderate, it would be characterized as low.
- The dominance of an impact of particular concern or significance could result in a high impact assessed for that entire route, even if the remainder of the route would result in moderate or low impacts.

Impact characterizations (L-M, M-H, etc.) for each route are shown in the upper left-hand corner of each resource category data-block.

Significant Unavoidable Adverse Impacts

The environmentally preferred route should minimize significant unavoidable adverse impacts.

By definition, the adverse impacts remaining after the application of committed mitigation (residual impacts) are unavoidable. Although the proposed Project would create numerous impacts, decision-making should focus on those that are "significant." In order to determine whether an environmental impact would be significant, thresholds, priorities and the likelihood of

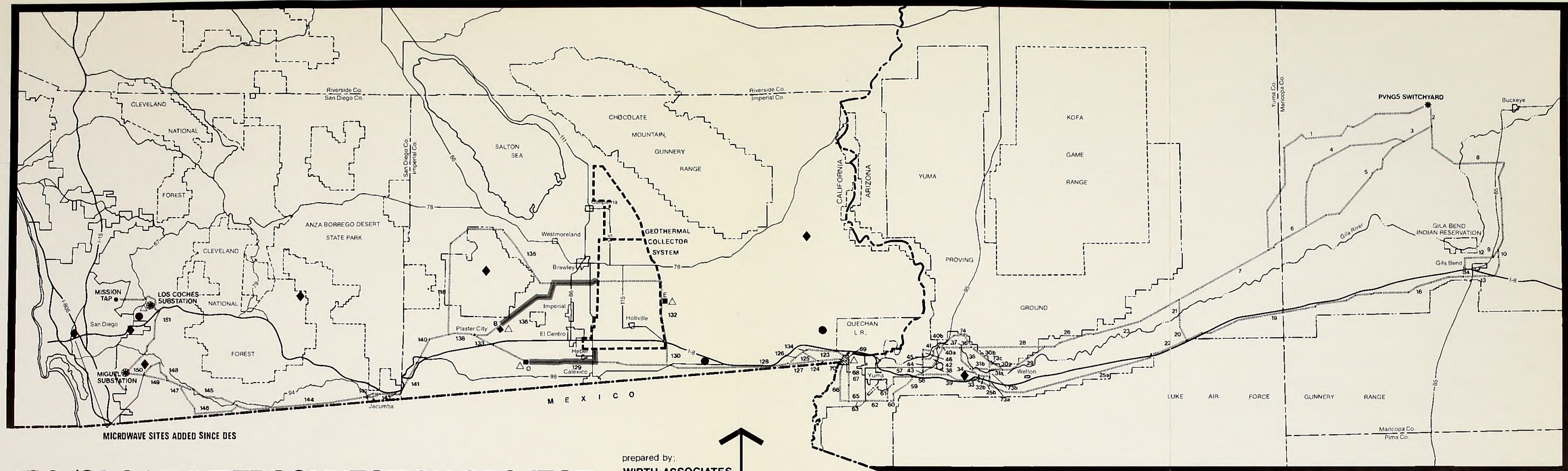
TABLE 3-8b
FINAL ANCILLARY FACILITIES EVALUATED

Yuma Substations and Associated 69kV Transmission System

Yucca Substation, Route 1	Links 212,213
Gila Substation, Route 2	Links 208,209,213
North Gila Substation, Route 3	Links 204,205,206,207,209,213, 210,211
Dome Valley Substation, Route 4	Links 201,211,202,207,209,213,203, 205

Imperial Valley Substation and Associated 161kV Transmission System

Site D Substation, Route 1	Links D-2, B-D
Site B Substation, Route 2	Links B-2, B-D
Site E Substation - No 161kV system necessary	



APS/SDG&E INTERCONNECTION PROJECT

FINAL LINKS AND ANCILLARY FACILITIES

500/230kV Transmission Lines

66 Link and Number

Substations

- Alternative Imperial Valley Substation Sites
- Expanded (Los Coches, Miguel)
- Alternative Yuma Substations
- Associated with Substations
- Associated with Existing Facilities
- New Sites

69kV/161kV Transmission Lines

- Typical Alternative 161kV Transmission Corridor
- Typical Alternative 69kV Transmission Corridor

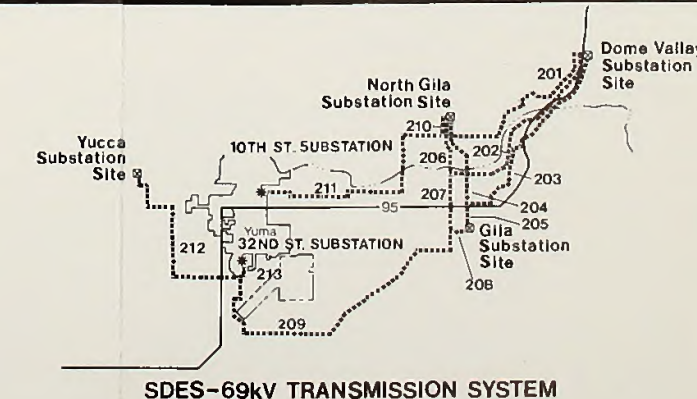
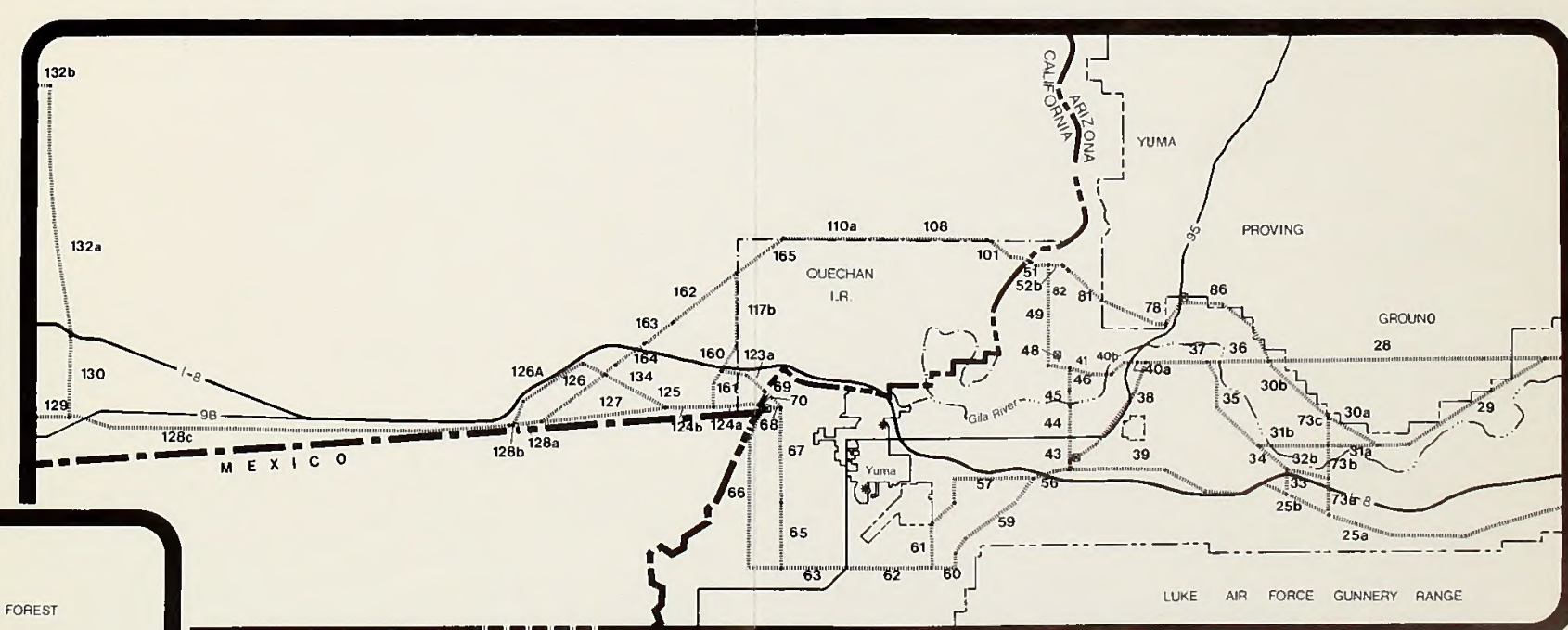
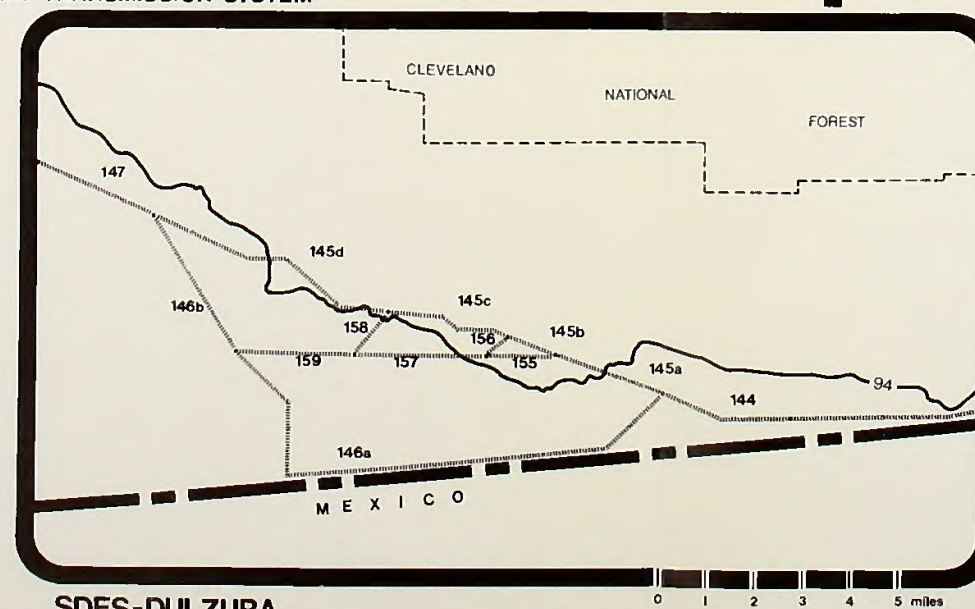
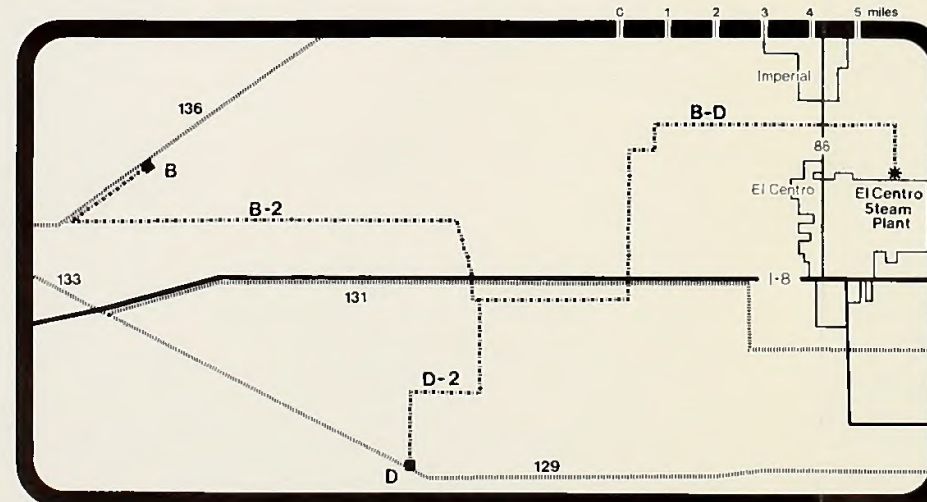
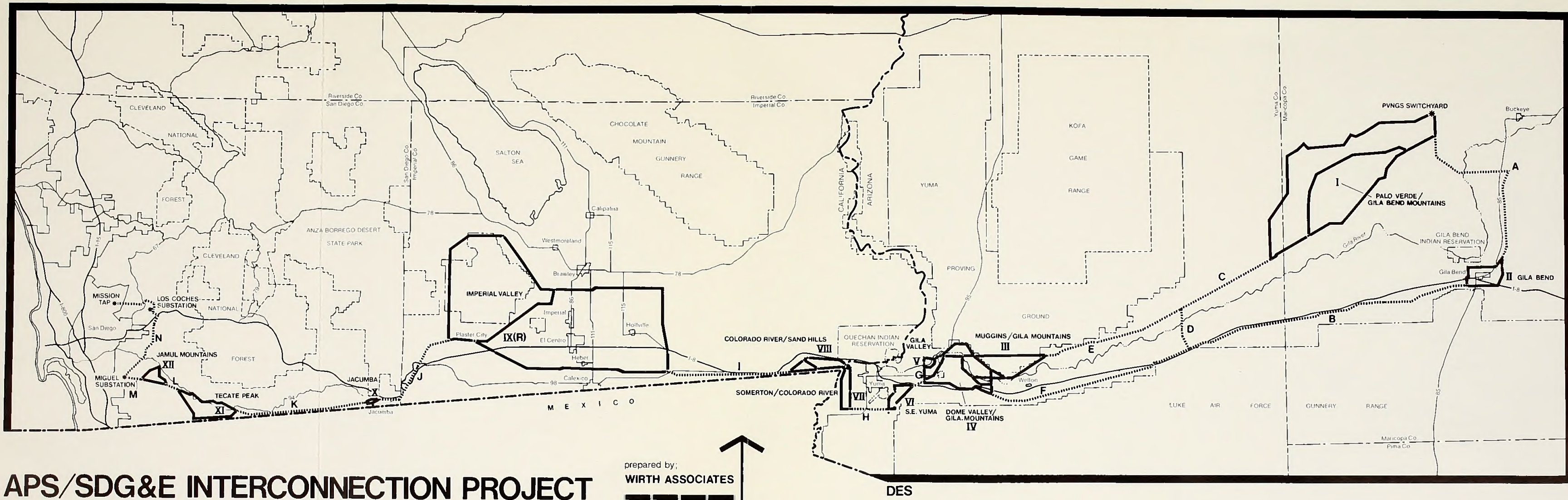


Figure 3-13(R)



APS/SDG&E INTERCONNECTION PROJECT

SETS AND CONNECTORS

Sets
 Connectors
 Note - 500kV Routes Remain the Same as in the DES,
 However, the Set IX (R) Comparison now Includes
 SDES Ancillary Facilities.

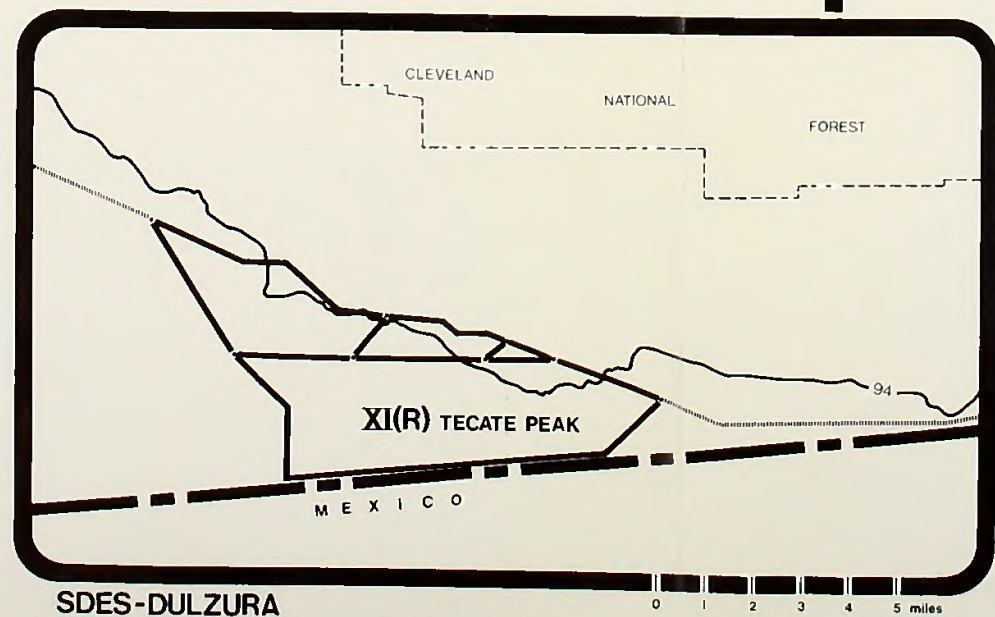
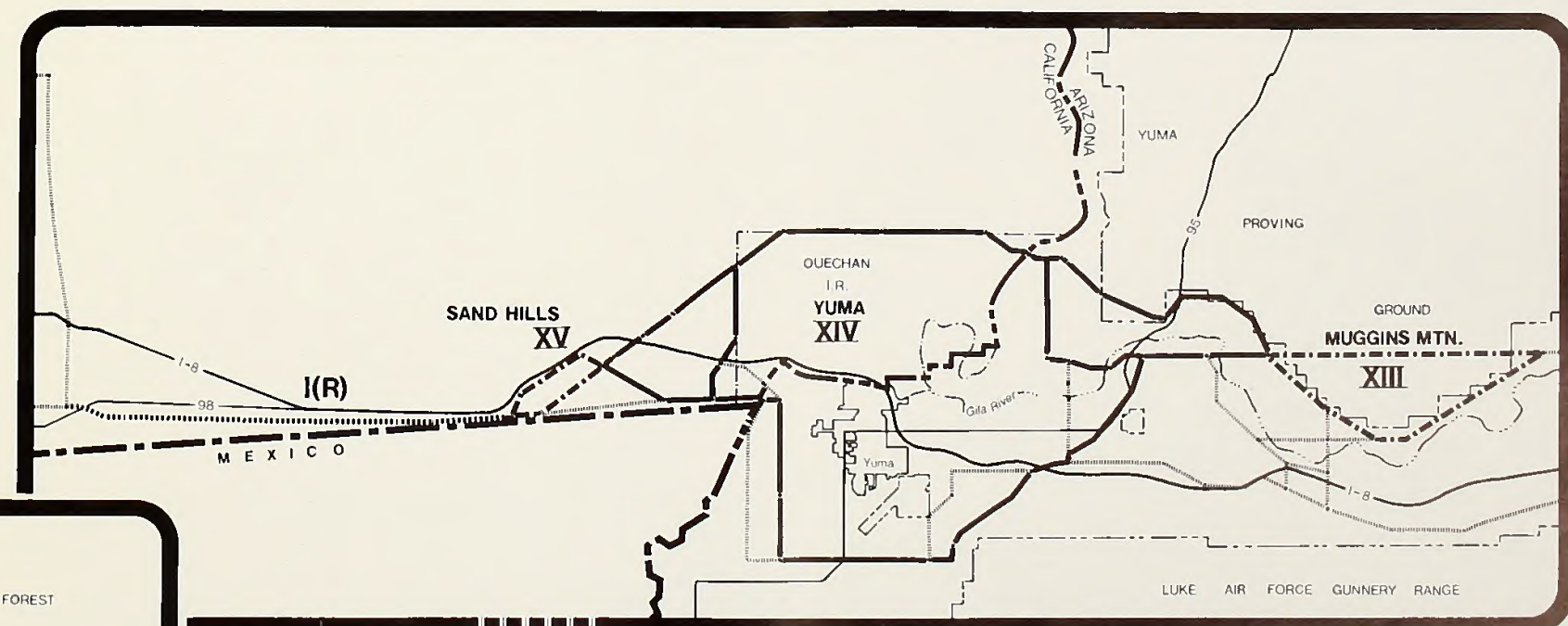


Figure 3-14 (R)



Route crosses due west through the Muggins Mountains passing north of Muggins Mountain.

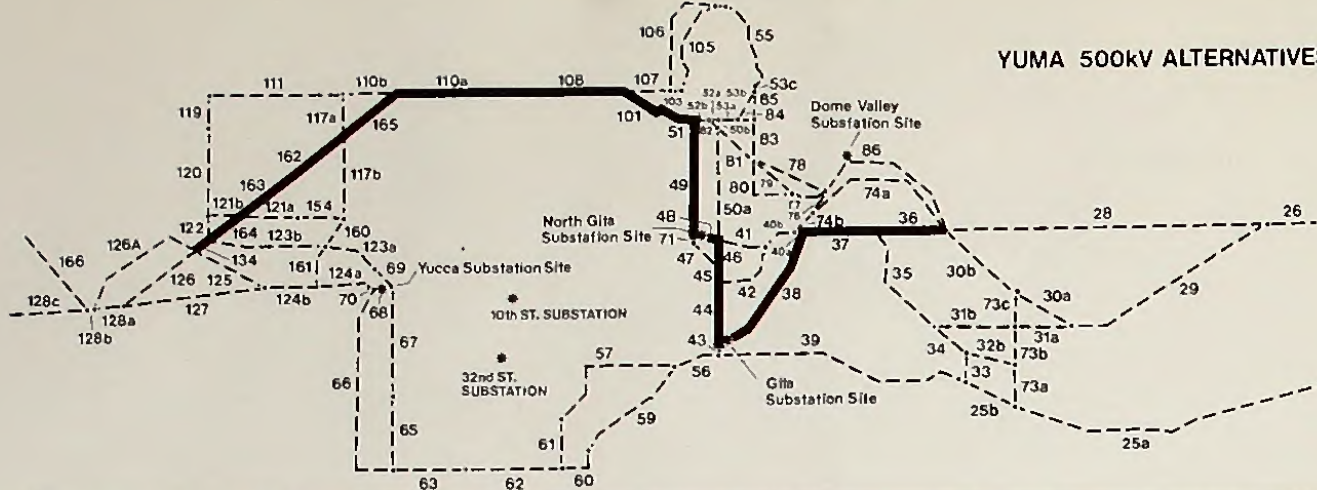
*SET XIII - Route 2 - Muggins Mountains

The preferred route follows the base of the Muggins Mountains and lies just outside the agricultural land. Routing in a southwesterly direction for 7.5 miles, the preferred route then turns due west for approximately 1.5 miles before turning northwest for the remaining distance. For approximately the last 7.0 miles this route would lie just outside of the Yuma Proving Grounds and parallel to the Dome Canal and the Dome Protective Channel.

TABLE 3-XR)

*Environmentally Preferred Route

YUMA 500kV ALTERNATIVES



ALTERNATIVE 69kV TRANSMISSION SYSTEM



Route 1 starts at the western foothills of the Muggins Mountains and proceeds west crossing Dome Valley, the Gila River and the foothills of the Gila Mountains before turning southwest and generally paralleling the Southern Pacific Railroad to the Gila Substation. The route then proceeds due north to the North Gila Substation site, crossing the western edge of the Laguna Mountains and passing just west of Sugar Loaf Mountain. The route turns west at the West Main Canal and crosses the Colorado River just below Laguna Dam. In California, the route parallels the All-American Canal for approximately two miles before turning west and following the northern boundary of the Fort Yuma Indian Reservation. At the base of the Cargo Muchacho Mountains the route and proceeds southwest in this direction until terminating at the All-American Canal.

Substation

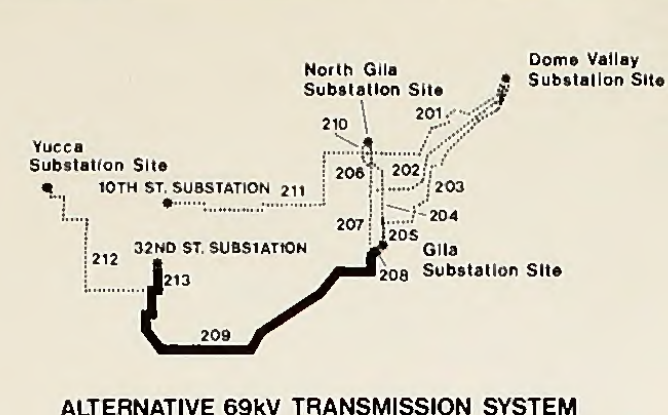
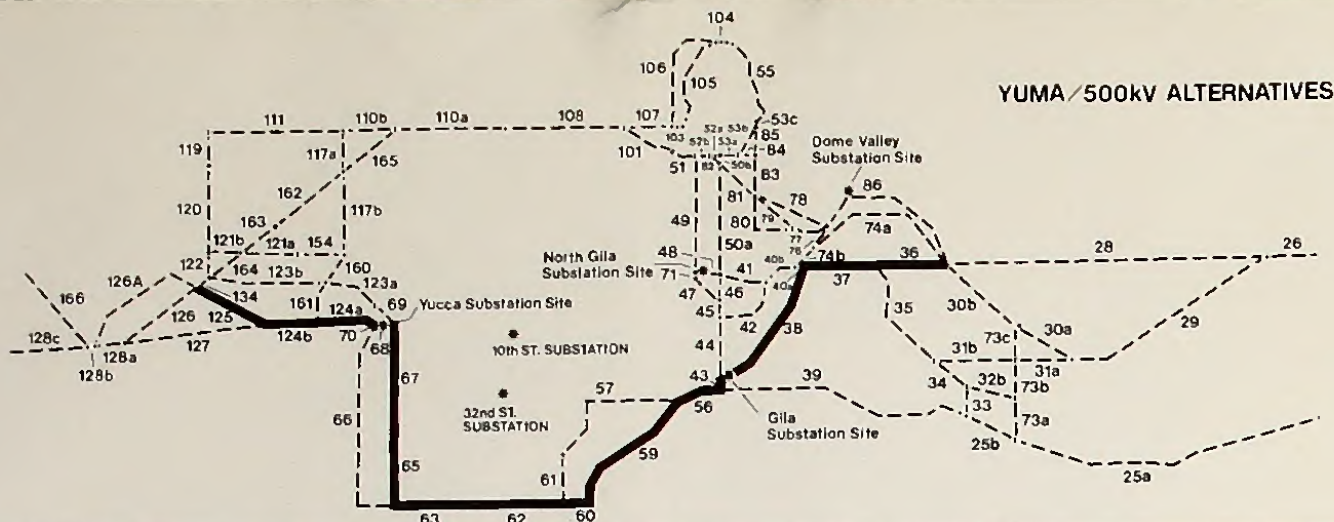
The Gila Substation alternative is located at an existing substation site on the Yuma Mesa north of I-8 and southwest of Arizona Western College.

69kV

Only one 69kV line would be required from the Gila Substation Alternative. The 69kV route proceeds south, passes the Gila Substation, crosses I-8, passes south and west around Yuma before turning north and ending at the 32nd Street Substation.

TABLE 3-9R)

SET OR CONNECTOR	ALT ROUTE	LENGTH OF ROUTE	ENVIRONMENTAL CONSEQUENCES										ESTIMATED COSTS	
			GEOTECHNICAL FEATURES	ECOLOGICAL RESOURCES	SOCIAL AND ECONOMIC LAND USES	AGRICULTURAL RESOURCES	PARK, PRESERVATION AND RECREATION LAND USES	VISUAL CHARACTERISTICS	ARCHAEOLOGICAL RESOURCES	HISTORICAL RESOURCES	NATIVE AMERICAN CULTURAL RESOURCES	AGENCY / PUBLIC COMMENTS		SUMMARY
XIV	RI. I 500kV (Links 36, 37, 38, 44, 45, 46, 48, 49, 51, 101, 108, 110a, 163, 162, 163, 164, 134)	45.3	L 3	M 3 High residual impact at Colorado River crossing. Waterfowl collision hazard.	L 4	M 3 Crosses 6.45 miles, removing 3.74 acres.	L 3 Crosses restricted ORV area.	H-M 3 Structures contrast; Colorado River area of high visual quality.	H-M 2 Crosses Píchocho Basin - area identified by BLM as having "very high" sensitivity.	M 2 Adjacent to San Ysidro Hacienda (National Register).	M 2 Crosses multiple-resource area and reservation; visible from other sites.	Oppose crossing agricultural land. Potential bird collision hazard. Concern for visual impact. River crossing is second choice of Arizona Game and Fish Department and U.S. Fish and Wildlife Service.	Route 1 can be characterized as having moderate-to-high cumulative impacts, primarily as a result of impacts associated with the 500kV route. The Gila Substation is the preferred site among the four alternatives considered and can be characterized as having low impacts overall except for ecological resources (moderate). The Gila 69kV route can be characterized as having low-to-moderate impacts and is the first or second choice, with the exception of ecology, for most resources. The cumulative impacts associated with the Route 1 make it more desirable than Routes 3, 4 or 5 but less desirable than either Routes 2 or 6. High-to-moderate impact characterizations were identified for visual and archaeological resources along the 500kV route. A high residual impact for ecological resources would occur at the Colorado River crossing of the 500kV route.	11,074,000
	Gila Sub-station	1 square mile	L 1	M 3 Flat-tailed horned lizard habitat; possible BLM sensitive plants.	N 1	N 1	N -	L 1	L -	N 1	N 1	Local residents suggested alternative substation east of Yuma should be evaluated.		13,645,000
	Gila 69kV (Links 208, 209, 213)	15.7	L 1	M-L 4	L 1	M 2 Crosses 1.01 miles, removing 0.29 acre.	L 1	L-M 2 Structures contrast; high visibility from area residences.	L 1	L 2	N 1			1,114,000
	Cumulative		L 3 Cumulative preference is primarily based upon preference rankings for alternative 500kV routes. Southern 500kV routes would cross less undisturbed land and, therefore would create less soil disturbance than northern routes. Differences in cumulative rankings of northern routes are based upon both the 500kV and 69kV transmission line impacts. Route 1 is assigned third preference based upon the 500kV preference. The Gila Substation and 69kV line neither increase nor decrease this preference.	M 4 This alternative is less preferable than either southern 500kV route or the northern Route 6. Route 1 would have more impacts associated with the 500kV, substation site, and the 69kV line than Route 6.	L 4 The 500kV alignment proposed in Route 1 is the least preferable of northern routing alternatives considered.	M 3 Cumulative ranking for this alternative is a result of preference ranking for the 500kV route. Route 1 is the least preferred of the northern 500kV alignments. This 500kV route would impact more agricultural land than any other northern alignment.	L 1 Routes 1, 2, 3, 4 and 6 are assigned equal cumulative preference. Although differences in preference exist for 500kV alignments, only Route 5 can be distinguished as least preferable.	H-M 3 Cumulative preference is primarily based upon the location of 500kV routes. Where preferences for 500kV alignments are equal, substation sites and 69kV route are factors in preference ranking. Northern 500kV alignments are preferable to southern alignment since they would avoid residences. Route 1 is the third preference due to a higher impact characterization on the 500kV route than either Routes 4 or 5.	H-M 3 Cumulative preference for alternatives is primarily based upon impact characterizations and significant unavoidable adverse impacts that would be associated with 500kV routes. Generally, southern 500kV routes would have less impact to archaeological resources. Route 1 is the preferred of all the northern alternatives considered due to the fewer impacts associated with both the 500kV and 69kV routes.	M 1 Cumulative preference is based upon the combinations of impacts that would occur from 500kV and 69kV routes. While this 500kV route is not the preferred, few impacts would be associated with the substation site and 69kV route. 500kV routes receiving higher preference are combined with low-preference ancillary facilities. Route 1 is preferred for historic resources.	L 2 Cumulative preference is primarily based upon impacts that would result from alternative 500kV routes. Occasionally, a substation site and/or subtransmission routing affects preference ranking for systems. Route 1 is ranked second due to the preference ranking of the 500kV route and no impacts predicted for the associated substation and 69kV routes.	25,833,000		



*SET XIV - Route 2 - Gila (South)

Route 2 starts at the western foothills of the Muggins Mountains and proceeds west, crossing Dome Valley, the Gila River, and the foothills of the Gila Mountains, before turning southwest and generally paralleling the Southern Pacific Railroad to the Gila Substation. Route 2 then crosses I-8, parallels a canal in a southwesterly direction to the junction of Avenue 4 and 15th Street where the route turns west. After crossing Highway 95, Route 2 leaves the Yuma Mesa and enters the Yuma Valley. The route turns north at Avenue E proceeding to the Yucca Power Plant. The route then turns west crossing the Colorado River and parallels the All-American Canal for the remaining distance.

Substation

The Gila Substation alternative is located at an existing substation site on the Yuma Mesa just north of I-8 and southeast of Arizona Western College.

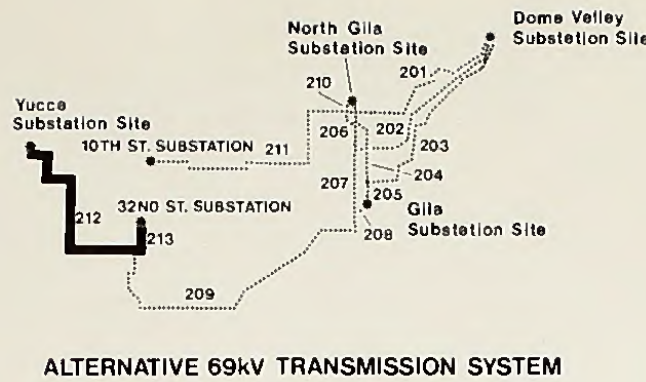
69kV

Only one 69kV line is required from the Gila Substation Alternative. This line proceeds south, passing by the Gila Substation, crosses I-8, travels south and west around Yuma before turning north and ending at the 32nd Street Substation.

TABLE 3-9(R)

SET OR CONNECTOR	ALT. ROUTE	LENGTH OF ROUTE	ENVIRONMENTAL CONSEQUENCES										ESTIMATED COSTS	
			GEOTECHNICAL FEATURES	ECOLOGICAL RESOURCES	SOCIAL AND ECONOMIC LAND USES	AGRICULTURAL RESOURCES	PARK, PRESERVATION AND RECREATION LAND USES	VISUAL CHARACTERISTICS	ARCHAEOLOGICAL RESOURCES	HISTORICAL RESOURCES	NATIVE AMERICAN CULTURAL RESOURCES	AGENCY/PUBLIC COMMENTS		SUMMARY
XIV (cont.)	*Rt. 2 500kV (Links 36, 37, 38, 43, 56, 59, 60, 62, 63, 65, 67, 68, 70, 124a, 124b, 125)	44.4	L	L	M-L Highly impacts 22 single-family dwellings, 1 airstrip and 2 subdivisions.	M Crosses 17.77 miles, removing 7.14 acres.	L	H Structures contrast; high visibility from area residences.	L-M Crosses Pilot Knob ACEC.	H-M Crosses Pilot Knob ACEC.	M Crosses Pilot Knob ACEC and multiple-resource area; visible from other habitation and sacred areas.	Opposition to route due to concerns for agricultural impacts, future growth of Yuma area, interference with desalting complex, and aesthetics. The preferred Colorado River crossing by Arizona Game and Fish Department, and U.S. Fish and Wildlife Service.	Route 1 is one of the two preferred routes in the Yuma area. Route 2 can generally be characterized as having moderate or moderate-to-high impacts. This characterization primarily results from significant impacts to agricultural, visual and socioeconomic resources and low-to-moderate impacts for ecological, archaeological, parks, preservation and recreation land use and Native American cultural resources. Route 2 is preferred to Route 3 for agricultural and socioeconomic land-use. No high impact characterizations are attributed to either the Gila Substation or associated 69kV system. Significant unavoidable adverse impacts to ecological resources would occur at the substation site and along the 69kV system. (Route 3 is the preferred southern route for ecological resources.)	13,492,000
	Gila Substation	1 square mile	L	M Flat-tailed horned lizard habitat; possible BLM sensitive plants.	N	N	N	L	L	N	N	Local residents suggested alternative substation north and east of Yuma be evaluated.		13,645,000
	Gila 69kV (Links 208, 209, 213)	15.7	L	M-L	L	M Crosses 1.01 miles, removing 0.29 acre.	L	L-M Structures contrast; high visibility from area residences.	L	L	N			1,114,000
	Cumulative		L Cumulative preference is primarily based upon preference rankings for alternative 500kV routes. Southern routes cross less undisturbed land and, therefore, would create less soil disturbance than northern routes. Differences in cumulative rankings for northern routes are based upon impacts that would occur from both 500kV and 69kV routes.	L-M While southern 500kV routes are preferred, this alternative is less preferable than Route 3 due to additional impacts that would be associated with the Gila Substation and 69kV route. Route 1 is also less preferable than Route 3 for the same reasons.	M-L Southern 500kV alignments would have more impact to socioeconomic land uses than northern alignments. Fifteen single-family dwellings would be located in the ROW of the southern 500kV route. Route 1 is slightly preferred to Route 3, which would have impacts resulting from the substation site and 69kV line.	M Southern 500kV alignments would have more impacts to agricultural lands than northern alignments. Low preference is assigned this route due to southern 500kV alignment. Route 2 is preferred to Route 3, which would highly impact agricultural resources at the Yucca Substation.	L See Route 1.	H See Route 1. The southern 500kV route would have high impacts to visual resources. Route 2 is less preferable than Route 3 because of a lower preference for the Gila 69kV route.	L-M Cumulative preference for alternatives is primarily based upon impact characterizations and significant unavoidable adverse impacts that would be associated with 500kV routes. Southern 500kV alternatives would have less impacts to archaeological resources. Route 2 is slightly less preferable than the archaeologically-preferred Route 3 because of differences in impact that would occur with the 69kV route.	H-M Low cumulative preference is based upon the combination of impacts that would occur from 500kV and 69kV routes.	L Cumulative preference is primarily based upon impacts that would occur from alternative 500kV routes. A southern 500kV alignment is preferred. Route 2 is preferred over Route 3 because Route 3 would have substation-site impacts.			28,251,000

*Environmentally Preferred Route



Route 3 starts at the western foothills of the Muggins Mountains and proceeds west, crossing Dome Valley, the Gila River and the foothills of the Gila Mountains before turning southwest and generally paralleling the Southern Pacific Railroad to the Gila Substation. Route 3 then crosses I-8 and parallels a canal in a southwesterly direction to the junction of Avenue E and 15th Street where the route turns west. After crossing Highway 95, Route 2 leaves the Yuma Mesa and enters the Yuma Valley. The route turns north at Avenue E, proceeding to the Yucca Power Plant. The route turns west, crossing the Colorado River and parallels the All-American Canal for the remaining distance.

Substation

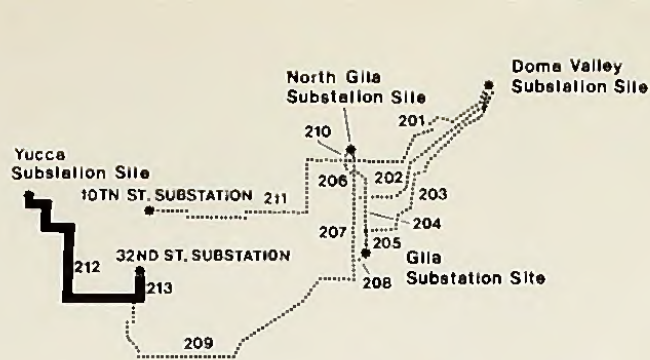
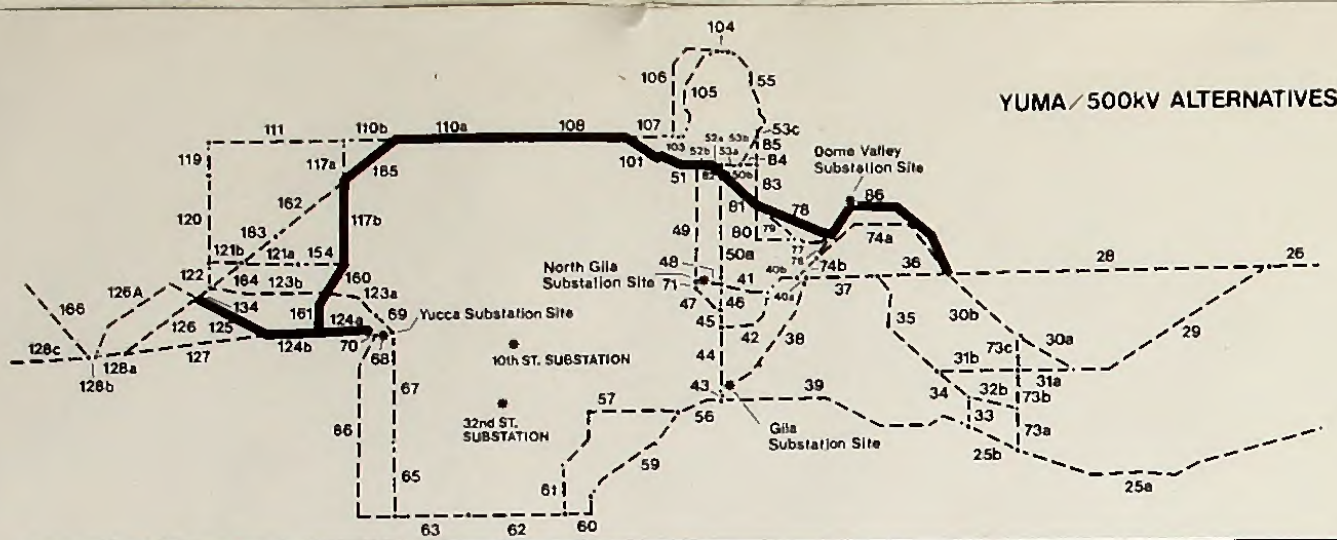
The Yucca Substation is adjacent to the Yucca Power Plant located in the Yuma Valley east of the Colorado River.

69kV

Only one 69kV line would be required from the Yucca Substation. This line travels south and east from the Yucca Substation before leaving the Yuma Valley. Once on the Yuma Mesa, the route turns north and enters the 32nd Street Substation.

TABLE 3-9(R)

SET OR CONNECTOR	ALT. ROUTE	LENGTH OF ROUTE	ENVIRONMENTAL CONSEQUENCES										ESTIMATED COSTS	
			GEOTECHNICAL FEATURES	ECOLOGICAL RESOURCES	SOCIAL AND ECONOMIC LAND USES	AGRICULTURAL RESOURCES	PARK, PRESERVATION AND RECREATION LAND USES	VISUAL CHARACTERISTICS	ARCHAEOLOGICAL RESOURCES	HISTORICAL RESOURCES	NATIVE AMERICAN CULTURAL RESOURCES	AGENCY/PUBLIC COMMENTS		SUMMARY
XIV (cont.)	Rt. 3 500kV (Links 36, 37, 38, 43, 56, 59, 60, 62, 63, 65, 67, 68, 70, 124a, 124b, 125)	44.4	L	I	M-L Highly impacts 15 single-family dwellings, 1 airstrip and 2 subdivisions.	M Crosses 17.77 miles, removing 7.14 acres.	L	H Structures contrast; high visibility from residences in Yuma area.	L-M Crosses Pilot Knob ACEC.	H-M Crosses Pilot Knob ACEC.	M Crosses Pilot Knob ACEC and a multiple-resource area; visible from other habitation sites and sacred sites.	Concerns include: loss of prime farmland, aesthetics, interference with desalting complex and future growth of Yuma. Impacts to residences. The preferred route of Arizona Game and Fish Department, and U.S. Fish and Wildlife Service.	Route 3 can be characterized as having high-to-moderate impacts on agricultural, visual and historic resources and moderate-to-low impacts on ecological, archaeological, Native American cultural resources, and park, preservation and recreation land-uses. The significant impacts predicted for agricultural, visual and social and economic land-use resources from the Yucca Substation and/or the southern 500kV route result in a low preference, despite the relatively few impacts resulting from 69kV transmission line.	13,492,000
	Yucca Substation	1 square mile	L	I	L Single-family dwelling located within study area.	H 50 acres removed.	N	L	L	N	H-M Adjacent to contemporary Cocopah cemetery and visible from homestead development (AZ) and Pilot Knob multiple-resource area and reservation (CA).	Relocate switchyard, east or north of Yuma. Loss of prime farmland.	Route 3 is the least preferable for agricultural resources among alternatives considered because of the cumulative impacts to agricultural resources from the Yucca Substation site and southern 500kV route. A southern 500kV route would have significant impacts to socioeconomic land-uses and visual resources. Thus, a low preference for the Route 3 (by these resources). Fewer impacts would occur to other resources on the southern 500kV route. For this reason, Route 3 is preferred for ecological, archaeological, geotechnical resources, and park, preservation and recreation land-uses.	14,153,000
	Yucca 69kV (Links 212, 213)	10.0	L	I	L Impacts 2 single-family dwellings.	N	L	L-M Structures contrast; visible from area residences.	L	L	L			639,000
	Cumulative		L See Route 2.	I Route 3 is preferred. Each component - 500kV route, substation site and 69kV system - is the most preferred of all alternatives for ecological resources.	M-L Significant unavoidable adverse impacts would be associated with a southern 500kV route. Low preference for Route 3 is a result of the impacts that would be associated with the 500kV route, Yucca Substation and 69kV transmission line.	H Southern 500kV alignment would have significant impacts to agricultural resources. Route 3 is less preferable than Route 2 due to the additional impacts that would occur at the Yucca Substation.	L See Route 1.	H See Route 2.	L-M Route 3 is the preferred route for archaeological resources due to low impact characterization and high preference for the 500kV alignment. Route 3 is preferred to Route 2 due to the additional predicted impacts associated with the Gila 69kV line.	H-M See Route 2. Route 3 is slightly preferred to the other southern 500kV alignment (Route 2) due to less impacts predicted for the 69kV transmission route.	M See Route 2. Route 3 is less preferable than either Routes 1 or 2 due to impacts that would be associated with the Yucca Substation.			28,284,000



ALTERNATIVE 69KV TRANSMISSION SYSTEM

SET XIV - Route 4 - Yucca (North)

Route 4 starts at the western foothills of the Muggins Mountains and proceeds northwest for 4.5 miles, turns west and intersects Highway 75. The route proceeds southwest for approximately 1.5 miles before turning northwest and passing through the Laguna Mountains. South of Mitty Lake the route turns west and crosses the Colorado River below Laguna Dam. In California the route parallels the All-American Canal for approximately two miles before turning west and following the northern boundary of the Ft. Yuma Indian Reservation. At the base of the Cargo Muchacho Mountains the route turns southwest and proceeds to the western boundary of the reservation. The route then turns south, crossing I-8 and passing west of Pilot Knob. At the All-American Canal the route turns east, crosses the Colorado River and enters the Yucca Substation site. The route then follows the same path back across the Colorado River and parallels the All-American Canal for the remaining distance.

Substation

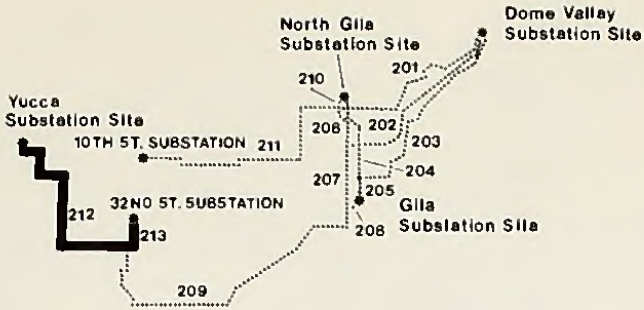
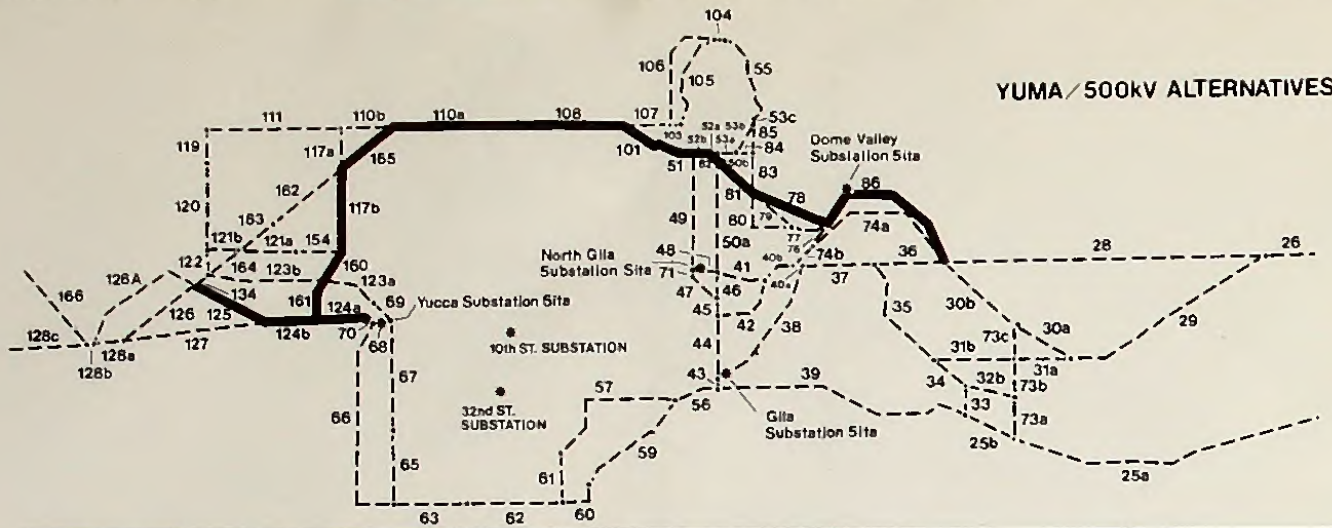
The Yucca Substation lies adjacent to the Yucca Power Plant and is located in the Yuma Valley east of the Colorado River.

69kV

Only one 69kV line would be required from the Yucca Substation. The route would travel south and east from the Yucca Substation before leaving the Yuma Valley. Once on the Yuma Mesa, the route turns north and enters the 32nd Street Substation.

TABLE 3-9(R)

SET OR CONNECTOR	ALT. ROUTE	LENGTH OF ROUTE	ENVIRONMENTAL CONSEQUENCES										ESTIMATED COSTS	
			GEOTECHNICAL FEATURES	ECOLOGICAL RESOURCES	SOCIAL AND ECONOMIC LAND USES	AGRICULTURAL RESOURCES	PARK, PRESERVATION AND RECREATION LAND USES	VISUAL CHARACTERISTICS	ARCHAEOLOGICAL RESOURCES	HISTORICAL RESOURCES	NATIVE AMERICAN CULTURAL RESOURCES	AGENCY / PUBLIC COMMENTS		SUMMARY
XIV (cont.)	Rt. 4 500kV (Links 86, 51, 52b, 78, 81, 82, 101, 108, 110a, 116, 117b, 160, 161, 124a, 70, 70, 124a, 124b, 125)	45.7	L 4	M-H 5 Three crossings of Colorado River - one with residual high impacts, two with residual moderate impacts; waterfowl collision hazard.	L 2	M 1 Crosses 0.6 mile, removing 0.44 acre.	L 5 Crosses restricted ORV area.	M 2 Structures contrast; Colorado River crossing in areas of high scenic quality.	H 5 Crosses Pilot Knob ACEC; crosses Picacho Basin - area designated by BLM as having "very high" sensitivity.	H-M 4 Crosses Pilot Knob ACEC.	H-M 5 Crosses Pilot Knob ACEC; crosses and parallels 2 multiple-resource areas and trails; visible from other sacred and habitation sites and rock art site.	Concern for potential bird collision, visual impacts, 3 river crossings. The river crossing was the second choice by Arizona Game and Fish Department, and U.S. Fish and Wildlife Service.	Route 4 can be characterized as having significant impacts to agricultural resources at the Yucca Substation and to ecological, archaeological, historic and Native American cultural resources along the 500kV route associated with this alternative. Predicted impacts for all resources, except socioeconomic land use and visual resources, result in a low cumulative preference, despite the relatively few impacts predicted for the associated 69kV distribution system. While the northern 500kV route has few predicted impacts on agricultural resources, the impacts predicted for the Yucca Substation site result in a low overall agricultural resource preference. The 500kV route, however, would result in significant impacts to other resources. The route requires three crossings of the Colorado River, creating significant unavoidable adverse impacts to waterfowl. Impacts to archaeological, historic and Native American resources can be summarized as high to high-to-moderate with several significant unavoidable adverse impacts.	13,113,000
	Yucca Substation	1 square mile	L 1	L 1	L 2 Single-family dwelling potentially impacted.	H 2 50 acres removed.	N -	L 1	L -	N 1	H-M 2 Adjacent to cemetery; visible from Pilot Knob homestead and multiple-resource area.	Relocate switchyard east or north of Yuma.		14,153,000
	Yucca 69kV (Links 212, 213)	10.0	L 2	L 1	L 2 Impacts 2 single-family dwellings.	N 1	L 1	L-M 1 Structures contrast; high visibility from area residences.	L 1	L 1	L 2			639,000
	Cumulative		L 5 See Route 1.	M 6 Route 4 is the least preferable alternative due to high impact characterization and the significant unavoidable adverse impacts that would be associated with the 500kV route. Because of three Colorado River crossings, Route 4 would have significant residual impacts to ecological resources and increase the potential bird collision hazard.	L 1 Route 4 is preferred as it would have the least cumulative impacts of the alternatives evaluated. While the 500kV alignment of Route 5 is slightly preferred, Route 4 would have less impact from 69kV routing.	H 5 Route 4 is assigned low preference due to the high agricultural impacts associated with the Yucca Substation site. The 500kV alignment is ranked equally with Route 5.	L 1 See Route 1.	M 2 Cumulative preference for Route 4 is based upon preference for the 500kV alignment.	H 6 Significant impacts to archaeological resources are predicted for the 500kV alignment associated with Route 4. Since cumulative preference is primarily based upon impact characterization and significant impacts that would be associated with 500kV routes, Route 4 is the least preferable alternative for archaeological resources.	H-M 6 Cumulative preference for this alternative is primarily based upon the high-to-moderate impact characterization and the significant unavoidable adverse impacts associated with the 500kV route. The 500kV route of Route 4 is the least preferable of all routing alternatives evaluated.	M-H 6 A combination of low preference for the 500kV route and significant impacts that would be associated with the Yucca Substation site make Route 4 the least preferable.			27,905,000



SET XIV - Route 4 - Yucca (North)

Route 4 starts at the western foothills of the Muggins Mountains and proceeds northwest for 4.5 miles, turns west and intersects Highway 95. The route proceeds southwest for approximately 1.5 miles before turning north and passing through the Laguna Mountains. South of Mitty Lake the route turns west and crosses the Colorado River below Laguna Dam. In California the route parallels the All-American Canal for approximately two miles before turning west and following the northern boundary of the Ft. Yuma Indian Reservation. At the base of the Cargo Muchocho Mountains the route turns southwest and proceeds to the western boundary of the reservation. The route then turns south, crossing I-8 and passing west of Pilot Knob. At the All-American Canal the route turns east, crosses the Colorado River and enters the Yucca Substation site. The route then follows the same path back across the Colorado River and parallels the All-American Canal for the remaining distance.

69kV

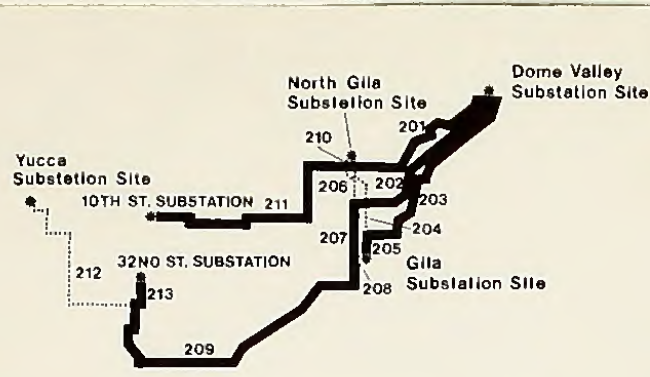
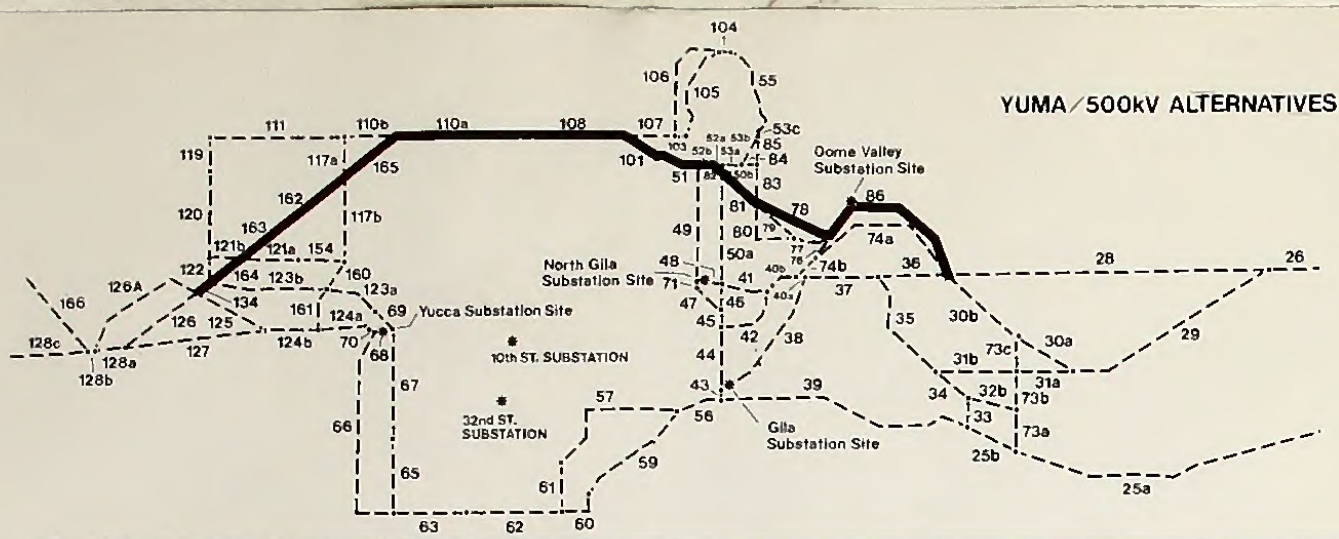
Only one 69kV line would be required from the Yucca Substation. The route would travel south and east from the Yucca Substation before leaving the Yuma Valley. Once on the Yuma Mesa, the route turns north and enters the 32nd Street Substation.

Substation

The Yucca Substation lies adjacent to the Yucca Power Plant and is located in the Yuma Valley east of the Colorado River.

TABLE 3-9(R)

SET OR CONNECTOR	ALT. ROUTE	LENGTH OF ROUTE	ENVIRONMENTAL CONSEQUENCES										ESTIMATED COSTS	
			GEOTECHNICAL FEATURES	ECOLOGICAL RESOURCES	SOCIAL AND ECONOMIC LAND USES	AGRICULTURAL RESOURCES	PARK, PRESERVATION AND RECREATION LAND USES	VISUAL CHARACTERISTICS	ARCHAEOLOGICAL RESOURCES	HISTORICAL RESOURCES	NATIVE AMERICAN CULTURAL RESOURCES	AGENCY/PUBLIC COMMENTS		SUMMARY
XIV (cont.)	Rt. 4 500kV (Links 86, 51, 52b, 78, 81, 82, 101, 108, 110a, 165, 117b, 160, 161, 124a, 70, 70, 124a, 124b, 125)	45.7	L 4	M-H 5 Three crossings of Colorado River - one with residual high impacts; two with residual moderate impacts; waterfowl collision hazard.	L 2	M 1 Crosses 0.6 mile, removing 0.44 acre.	L 5 Crosses restricted ORV area.	M 2 Structures contrast; Colorado River crossing in areas of high scenic quality.	H 5 Crosses Pilot Knob ACEC; crosses Picacho Basin - area designated by BLM as having "very high" sensitivity.	H-M 4 Crosses Pilot Knob ACEC.	H-M 5 Crosses Pilot Knob ACEC; crosses and parallels 2 multiple-resource areas and trail; visible from other sacred and habitation sites and rock art site.	Concern for potential bird collision, visual impacts, 3 river crossings. The river crossing was the second choice by Arizona Game and Fish Department, and U.S. Fish and Wildlife Service.	Route 4 can be characterized as having significant impacts to agricultural resources at the Yucca Substation and to ecological, archaeological, historic and Native American cultural resources along the 500kV route associated with this alternative. Predicted impacts for all resources, except socioeconomic land use and visual resources, result in a low cumulative preference, despite the relatively few impacts predicted for the associated 69kV distribution system. While the northern 500kV route has few predicted impacts on agricultural resources, the impacts predicted for the Yucca Substation site result in a low overall agricultural resource preference. The 500kV route, however, would result in significant impacts to other resources. The route requires three crossings of the Colorado River, creating significant unavoidable adverse impacts to waterfowl. Impacts to archaeological, historic and Native American resources can be summarized as high to high-to-moderate with several significant unavoidable adverse impacts.	13,113,000
	Yucca Substation	1 square mile	L 1	L 1	L 2 Single-family dwelling potentially impacted.	H 2 50 acres removed.	N -	L 1	L -	N 1	H-M 2 Adjacent to cemetery; visible from Pilot Knob homestead and multiple-resource area.	Relocate switchyard east or north of Yuma.		14,153,000
	Yucca 69kV (Links 212, 213)	10.0	L 2	L 1	L 2 Impacts 2 single-family dwellings.	N 1	L 1	L-M 1 Structures contrast; high visibility from area residences.	L 1	L 1	L 2			639,000
	Cumulative		L 5 See Route 1.	M 6 Route 4 is the least preferable alternative due to high impact characterization and the significant unavoidable adverse impacts that would be associated with the 500kV route. Because of three Colorado River crossings, Route 4 would have significant residual impacts to ecological resources and increase the potential bird collision hazard.	L 1 Route 4 is preferred as it would have the least cumulative impacts of the alternatives evaluated. While the 500kV alignment of Route 5 is slightly preferred, Route 4 would have less impact from 69kV routing.	H 5 Route 4 is assigned low preference due to the high agricultural impacts associated with the Yucca Substation site. The 500kV alignment is ranked equally with Route 5.	L 1 See Route 1.	M 2 Cumulative preference for Route 4 is based upon preference for the 500kV alignment.	H 6 Significant impacts to archaeological resources are predicted for the 500kV alignment associated with Route 4. Since cumulative preference is primarily based upon impact characterization and significant impacts that would be associated with 500kV routes, Route 4 is the least preferable alternative for archaeological resources.	H-M 6 Cumulative preference for this alternative is primarily based upon the high-to-moderate impact characterization and the significant unavoidable adverse impacts associated with the 500kV route. The 500kV route of Route 4 is the least preferable of all routing alternatives evaluated.	M-H 6 A combination of low preference for the 500kV route and significant impacts that would be associated with the Yucca Substation site make Route 4 the least preferable.			27,905,000



SET XIV - Route 5 - Dome Valley

Route 5 starts at the western foothills of the Muggins Mountains and proceeds northwest for 4.5 miles, turns west and intersects Highway 95 and the Dome Valley Substation site. The route proceeds southwest for approximately 1.5 miles before turning northwest and passing through the Laguna Mountains. South of Mitty Lake the route turns west and crosses the Colorado River below Laguna Dam. In California the route parallels the All-American Canal for approximately two miles before turning west and following the northern boundary of the Ft. Yuma Indian Reservation. At the base of the Cargo Muchacho Mountains the route turns southwest and proceeds in this direction until terminating at the All-American Canal.

Substation

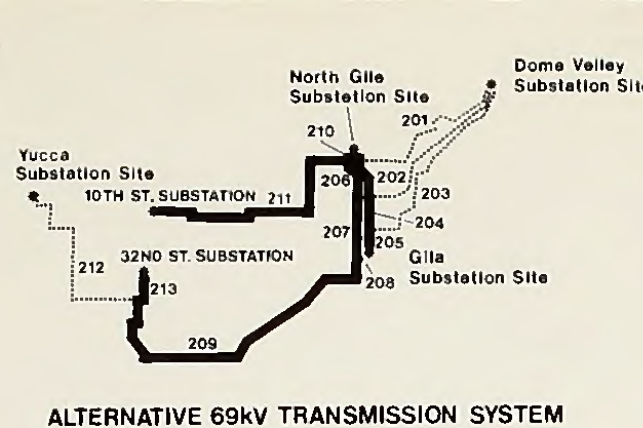
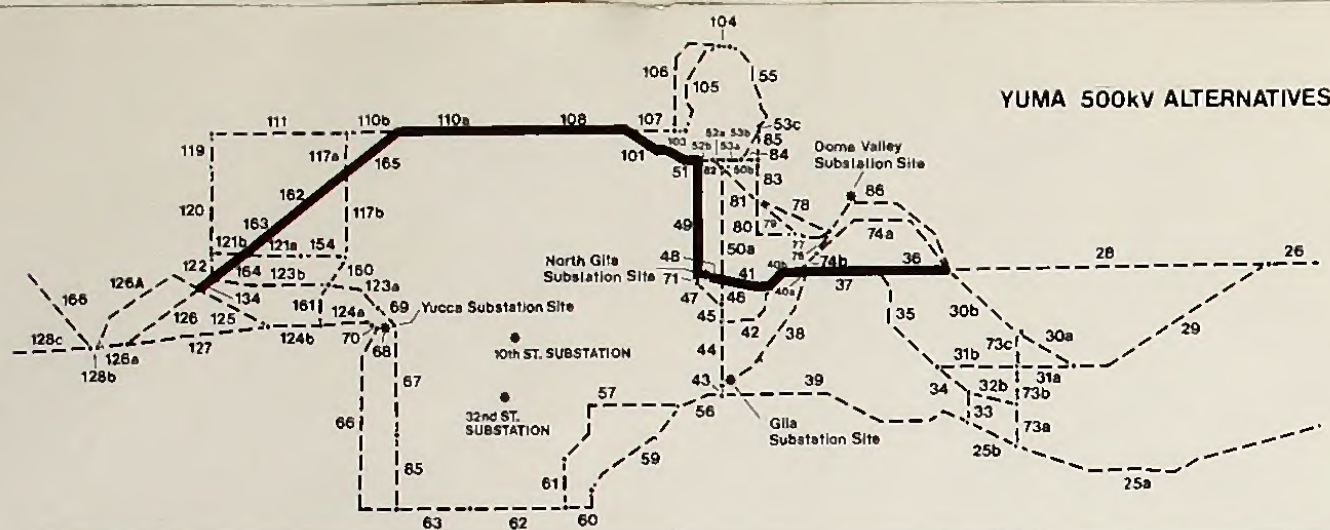
The Dome Valley Substation is located at the north end of Dome Valley, east of Highway 95, west of Castle Dome Wash and north of the Gila River.

69kV

The 69kV system from the Dome Valley Substation is composed of three separate lines. The first line radiates south and west into the 10th Street Substation. The second line travels southwest terminating at the Gila Substation. The third line proceeds southwest, passing the Gila Substation, crosses I-8, travels south and west around Yuma before turning north and terminating at the 32nd Street Substation.

TABLE 3-9(R)

SET OR CONNECTOR	ALT. ROUTE	LENGTH OF ROUTE	ENVIRONMENTAL CONSEQUENCES										ESTIMATED COSTS	
			GEOTECHNICAL FEATURES	ECOLOGICAL RESOURCES	SOCIAL AND ECONOMIC LAND USES	AGRICULTURAL RESOURCES	PARK, PRESERVATION AND RECREATION LAND USES	VISUAL CHARACTERISTICS	ARCHAEOLOGICAL RESOURCES	HISTORICAL RESOURCES	NATIVE AMERICAN CULTURAL RESOURCES	AGENCY/PUBLIC COMMENTS		SUMMARY
XIV (cont.)	Rte. 5 500kV (Links 86, 51, 52b, 78, 81, 82, 101, 108, 110a, 110b, 165, 164, 163, 164, 134)	36.7	L-M 5	M 4 High residual impacts at Colorado River crossing; waterfowl collision hazard.	L 1	M 1 Crosses 0.60 mile, removing 0.44 acre.	L 4 Crosses restricted DRV area.	M 1 High visual quality at the Colorado River and structures contrast.	H 4 Crosses Picocho Basin - area designated by BLM as having "very high" sensitivity.	M 1	M 3 Crosses multiple-resource area and reservation; visible from other habitation, sacred, and art sites.	Concern for crossing agricultural land. Potential bird collision and visual impacts. River crossing is the second choice of Arizona Game and Fish Department, and U.S. Fish and Wildlife Service.	Cumulatively, Route 5 can be characterized as having a potential moderate impact, although impacts to archaeological resources are characterized as high for the 500kV route. A relatively low preference for the Dome Valley alternative results primarily from the cumulative impacts of the 69kV system and the northern 500kV route. The Dome Valley 69kV system is characterized as the least preferable of the four alternatives. Route 5 is the preferred alternative for agricultural and visual resources, while receiving low preference for ecological, archaeological, Native American and geotechnical resources. Significant unavoidable adverse impacts would result to most resources from 69kV system and/or the 500kV route.	8,463,000
	Dome Valley Substation	1 square mile	L 2	M 4 Sensitive desert-wash habitat and state-protected plants.	N 1	N 1	N -	L 2	L -	N 1	N 1	15,254,000		
	Dome Valley 69kV (Links 201, 211, 202, 207, 209, 213, 203, 205)	55.6	L 4	L-M 3 Crosses approximately 2 miles of riparian plant habitat.	L-M 4 Impacts 37 single-family dwellings and 4 mobile home parks.	M 3 Crosses 7.31 miles, removing 1.69 acres.	M 2 Crosses N.R. Adair Park (county).	M-L 4 Structures contrast; high visibility to area residences.	L 4	L-M 4 Adjacent to San Ysidro Hacienda (National Register).	L-M 3	Local population suggested that an alternative switchyard location in Dome Valley should be evaluated.		3,761,000
	Cumulative		L 6 Cumulative preference is based upon an evaluation of the amount of undisturbed land crossed. Route 5 would cross more undisturbed land, creating more soil disturbance, than the other 500kV routes. In addition, the Dome Valley Substation is least preferable. Route 5, therefore, is the least preferable alternative.	M 5 The low preference for Route 5 is a result of the low preferences for each of the system components. The Dome Valley Substation is the least preferable substation site.	L 3 Route 5 is less preferable than two other northern alternative systems due to the greater impacts of the 69kV system.	M 1 Preference for 500kV routings is an important factor in cumulative preference for alternative systems. Route 5 is the preferred alternative due to preference for the 500kV route and the lack of impacts associated with the Dome Valley Substation.	L-M 2 Route 5 is least preferable due to the low preference for the 500kV route and the impacts that would be associated with the 69kV system.	M 1 Route 5 is preferred because the 500kV alignment would have the least visual impacts of alternatives evaluated, despite cumulative impacts associated with 69kV system.	H 5 Route 5 is assigned low cumulative preference due to the high impact characterization and significant unavoidable adverse impacts that would be associated with the 500kV route and the low preference assigned the Dome Valley Substation.	M 2 The significant unavoidable adverse impacts that would be associated with the Dome Valley 69kV system lowers preference ranking for Route 5. Due to preference for the 500kV route, Route 5 is the second choice among alternative systems.	M 5 Impacts predicted for both the 500kV and 69kV routes result in low preference for Route 5.	27,478,000		



***SET XIV - Route 6 - North Gila**

Beginning east of the Dome Canal, Route 6 proceeds west crossing Dome Valley, the Gila River, the northern foothills of the Gila Mountains, Highway 95 and the Gila River (second time), then parallels the Gravity Main Canal. Turning north at the North Gila Substation site the route crosses the western edge of the Laguna Mountains, passing west of Sugar Loaf Mountain. The route turns west at the West Main Canal and crosses the Colorado River below Laguna Dam. In California the route parallels the All-American Canal for approximately two miles before turning west and following the northern boundary of the Ft. Yuma Indian Reservation. At the base of the Cargo Muchacho Mountains the route proceeds southwest until terminating at the All-American Canal.

69kV

The 69kV system from the North Gila Substation is composed of three separate lines. The first line radiates west to the 10th Street Substation. The second line travels south terminating at the Gila Substation. The third line proceeds south, passes the Gila Substation, crosses I-8, routes south and west around Yuma before turning north and terminating at the 32nd Street Substation.

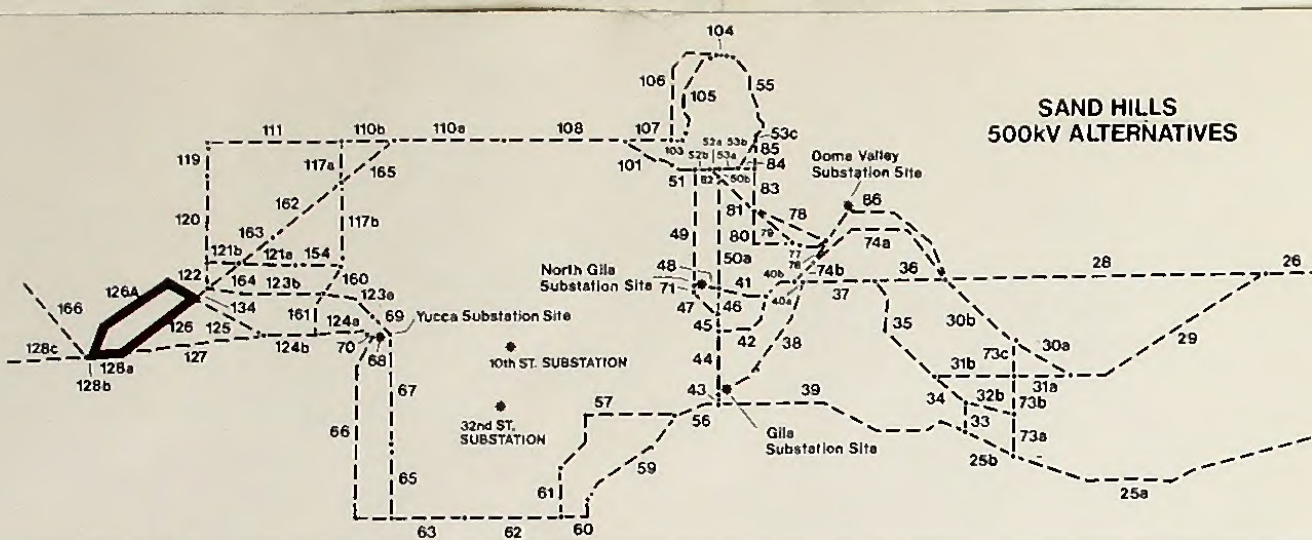
Substation

The North Gila Substation site is located on the southwest edge of the Laguna Mountains north of the Gila Main Canal.

TABLE 3-9(R)

SET OR CONNECTOR	ALT. ROUTE	LENGTH OF ROUTE	ENVIRONMENTAL CONSEQUENCES										ESTIMATED COSTS	
			GEOTECHNICAL FEATURES	ECOLOGICAL RESOURCES	SOCIAL AND ECONOMIC LAND USES	AGRICULTURAL RESOURCES	PARK, PRESERVATION AND RECREATION LAND USES	VISUAL CHARACTERISTICS	ARCHAEOLOGICAL RESOURCES	HISTORICAL RESOURCES	NATIVE AMERICAN CULTURAL RESOURCES	AGENCY / PUBLIC COMMENTS		SUMMARY
XIV (cont.)	*Rt. 6 500kV (Links 36, 37, 40a, 40b, 41, 48, 49, 51, 101, 108, 110a, 165, 162, 163, 164, 134)	38.8	L 2	M 2 High residual impact at Colorado river crossings; waterfowl collision hazard.	L 3	M 2 Crosses 1.96 miles, removing 1.06 acres.	L 2 Crosses restricted ORV area.	H-M 3 Structures contrast; in Colorado River area of high visual quality.	H-M 3 Crosses Picocho Basin - area identified by BLM as having "very high" sensitivity.	M 2 Adjacent to San Ysidra Hacienda (National Register).	M-H 4 Crosses multiple-resource area and reservation; visible from sacred and habitation sites.	Concern for crossing of agricultural lands, visual impacts, and potential bird-collision hazard. A northern route is preferred by Yuma area residents. This route is second choice by Arizona Game and Fish Department, and U.S. Fish and Wildlife Service.	Route 6 is one of the preferred routes through the Yuma area. Route 6 is the second cumulative preference for ecological, agricultural, socioeconomic land use and geotechnical resources among the alternatives considered. Many of the agricultural and land use impacts associated with southern 500kV route alternatives are significantly less than those on Route 6, while impacts to ecological resources are only slightly greater than the ecologically preferred Route 3. Route 6 utilizes a northern 500kV route and avoids the three river crossings associated with Route 4. Route 6 can be characterized as having moderate to moderate-to-high impacts.	9,248,000
	North Gila Substation	1 square mile	L 2	L 2	N 1	N 1	N -	M 3 Structures contrast; proximity to area residences.	L -	M 2 Adjacent to San Ysidra Hacienda (National Register).	N 1	Local residents suggested an alternative substation north and east of Yuma be evaluated.	15,254,000	
	North Gila 69kV (Links 204, 205, 206, 207, 209, 213, 210, 211)	36.5	L 3	L-M 2 Crosses approximately 2 miles of riparian plant habitat.	L-M 3 Impacts 34 single-family dwellings and 4 mobile home parks.	M 4 Crosses 7.84 miles, removing 2.17 acres.	L 1	M-L 3 Structures contrast; high visibility to area residences.	L 3	L-M 3 Adjacent to San Ysidra Hacienda (National Register).	N 1		2,711,000	
	Cumulative		L 2 See Route 2. Route 6 is the preferred northern 500kV route. The North Gila Substation is preferred to the Dome Valley site (Route 5).	L-M 2 Route 6 is the preferred northern route. While a northern 500kV route is less preferable than a southern alignment, Route 6 is preferable to one of the two southern alternatives. The North Gila Substation and 69kV systems are slightly preferable over the Gila Substation and 69kV system (Route 2).	L 2 Route 6 is slightly less preferable than Route 4 due to lower preference for the 500kV alignment and potentially more impact associated with North Gila 69kV system.	M 2 Northern 500kV routing alternatives would have significantly fewer impacts to agricultural resources than southern alternatives. The 500kV alignment associated with Route 6 would have only slightly more impact than the agriculturally preferred Route 5. The North Gila Substation would not affect agricultural resources.	L 1 See Route 1.	H-M 4 Route 6 is the least preferable of the northern alternatives due to low preference for the 500kV route and cumulative impacts that would be associated with the North Gila Substation and 69kV system.	H-M 4 The 500kV routing alternative would have a significant impact to archaeological resources. Route 6 is less preferable than one other northern route due to predicted impacts in association with 69kV system and less preference for the 500kV route. However, Route 6 is preferable to either Route 4 or Route 5.	M 3 See Route 1. Route 6 is less preferable than Routes 1 and 5 due to the significant unavoidable adverse impacts that would be associated with the North Gila Substation site and 69kV system.	M 4 See Route 1. No impacts are predicted for the North Gila Substation and 69kV system. However, Route 6 is assigned low preference due to the impact characterization and significant unavoidable adverse impacts identified for the 500kV route.		27,213,000	

* Environmentally Preferred Route



*SET XV - Route 1 - Sand Hills

The preferred route proceeds in a northwest direction paralleling the All-American Canal for approximately one mile before turning southwest. The route then generally parallels an existing utility (transmission line) corridor and I-8 for the rest of its length terminating north of the International Border.

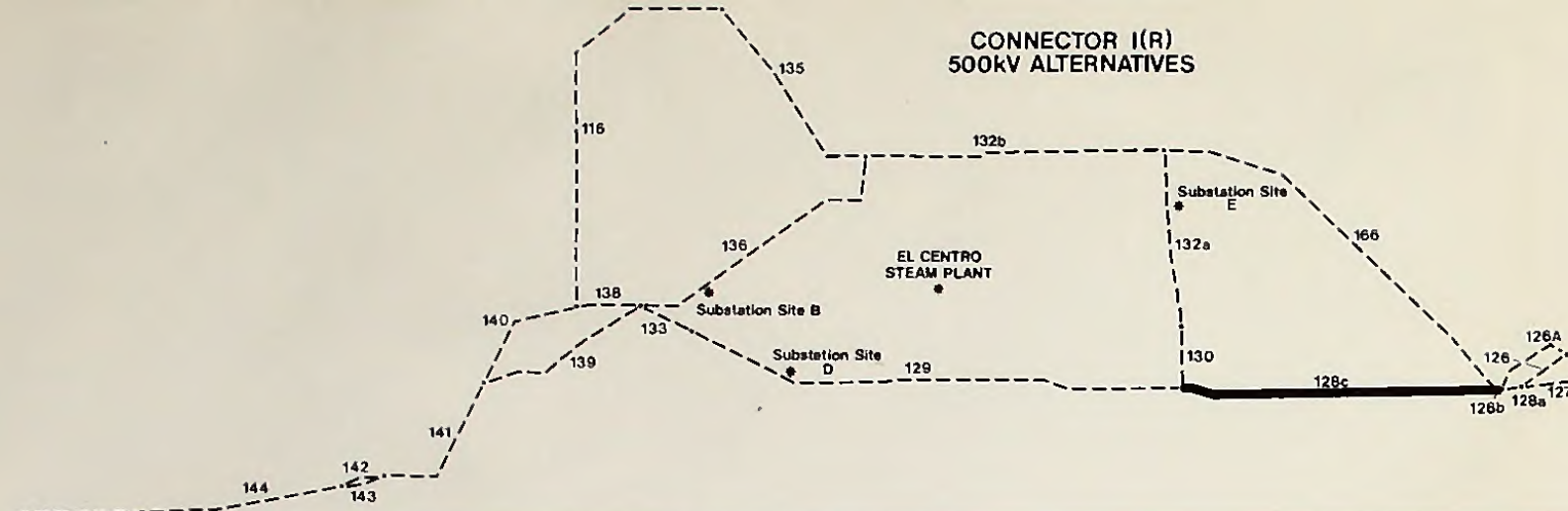
SET XV - Route 2 - Sand Hills

Route 2 proceeds southwest through the Sand Hills, south of Buttercup Valley, terminating north of the International Border.

TABLE 3-9(R)

SET OR CONNECTOR	ALT. ROUTE	LENGTH OF ROUTE	ENVIRONMENTAL CONSEQUENCES										ESTIMATED COSTS				
			GEOTECHNICAL FEATURES	ECOLOGICAL RESOURCES	SOCIAL AND ECONOMIC LAND USES	AGRICULTURAL RESOURCES	PARK, PRESERVATION AND RECREATION LAND USES	VISUAL CHARACTERISTICS	ARCHAEOLOGICAL RESOURCES	HISTORICAL RESOURCES	NATIVE AMERICAN CULTURAL RESOURCES	AGENCY / PUBLIC COMMENTS		SUMMARY			
XV	*Rt. 1 (Link 126A)	5.8	L	1 M-L Crosses 5.8 miles of special-status plants; crosses 5.8 miles of Andrew's scarab beetle habitat (disturbed).	N	-	N	-	M Crosses 1 "concentrated use" area.	1 H High scenic quality and strong structures contrast.	L-M	-	M Crosses Plank Road ACEC.	L	1	Route 1 is preferred. While resource impact characterizations are similar for most resources on both routes, Route 1 would have less impact to ecological and visual resources and park, preservation and recreation land-uses. The 126A alignment would follow an existing utility corridor (with existing access and disturbance) and would avoid impacts to a relatively undisturbed portion (Link 126) of the Sand Hills. The ecological resources preference for Route 1 is a result of 1.1 miles of high impact on Route 2 (Links 126, 128a). Significant unavoidable adverse impacts are predicted for ecological, visual and historic resources as well as park, preservation and recreation land-uses on both routes.	2,622,000
	Rt. 2 (Links 126, 128a)	5.1	L	2 H-M Crosses 5.1 miles of special-status plants; crosses 5.1 miles of Andrew's scarab beetle habitat.	N	-	N	-	M Crosses Buttercup Valley - "concentrated use" area.	2 H High scenic quality and strong structures contrast.	L-M	-	M Crosses Plank Road ACEC.	L	2		1,903,000

*Environmentally Preferred Route.

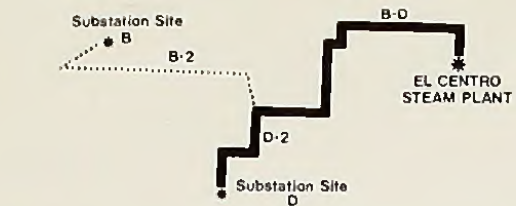
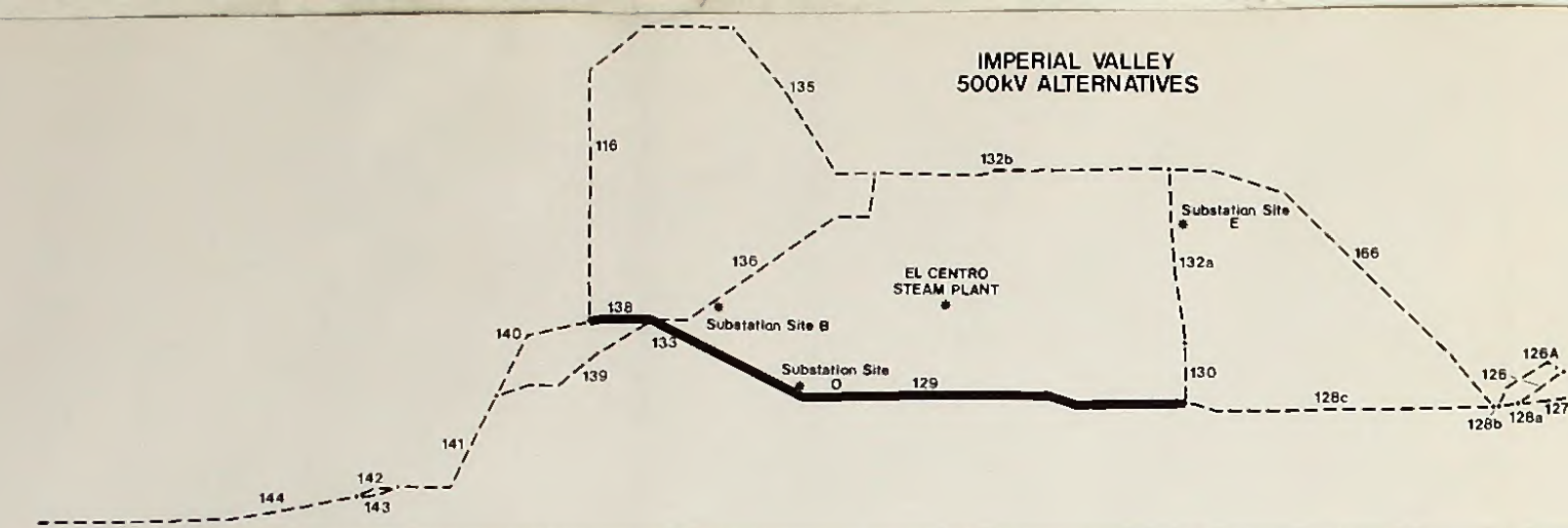


Connector I(R) proceeds west from the Sand Hills for approximately 20 miles parallel to and south of Interstate 8 before entering the Imperial Valley.

TABLE 3-9(R)

SET OR CONNECTOR	ALT. ROUTE	LENGTH OF ROUTE	ENVIRONMENTAL CONSEQUENCES											ESTIMATED COSTS
			GEOTECHNICAL FEATURES	ECOLOGICAL RESOURCES	SOCIAL AND ECONOMIC LAND USES	AGRICULTURAL RESOURCES	PARK, PRESERVATION AND RECREATION LAND USES	VISUAL CHARACTERISTICS	ARCHAEOLOGICAL RESOURCES	HISTORICAL RESOURCES	NATIVE AMERICAN CULTURAL RESOURCES	AGENCY / PUBLIC COMMENTS	SUMMARY	
Connector I(R)	*Connector I (R) (Links 128b, 128c)	20.7 miles	L -	M - Crosses 17 miles of flat-tailed horned lizard habitat.	N -	N -	L -	L-M - Strong structures contrast.	M-H - Crosses area designated by BLM as having "very high" sensitivity (proposed ACEC).	L-M - Visible from California historic landmark.	N -	Imperial Irrigation District - crosses All American Canal, potentially requires moving the IID 92kV line.	Connector I(R) can be summarized as having moderate impacts. Connector I(R) would cross a sensitive archaeological area and would be visible to a California historic landmark. Special-status wildlife habitat would be crossed.	6,610,000

*Environmentally Preferred Route.



ALTERNATIVE 161kV TRANSMISSION SYSTEM

*SET IX (R) - Route 1 - Imperial Valley

The preferred 500kV route proceeds west for approximately 25 miles through the agricultural lands of Imperial Valley, crosses the Alamo River, Highway 111 and the Westside Main Canal before turning north at the site of the Imperial Substation (Site D). The route proceeds across the West Mesa, crossing I-8 before turning west 1.5 miles from Plaster City. The route ends at the foothills of the Coyote Mountains.

Substation D

The Imperial Valley Substation (Site D) is approximately one mile west of the Westside Main Canal (at sea level) on the West Mesa.

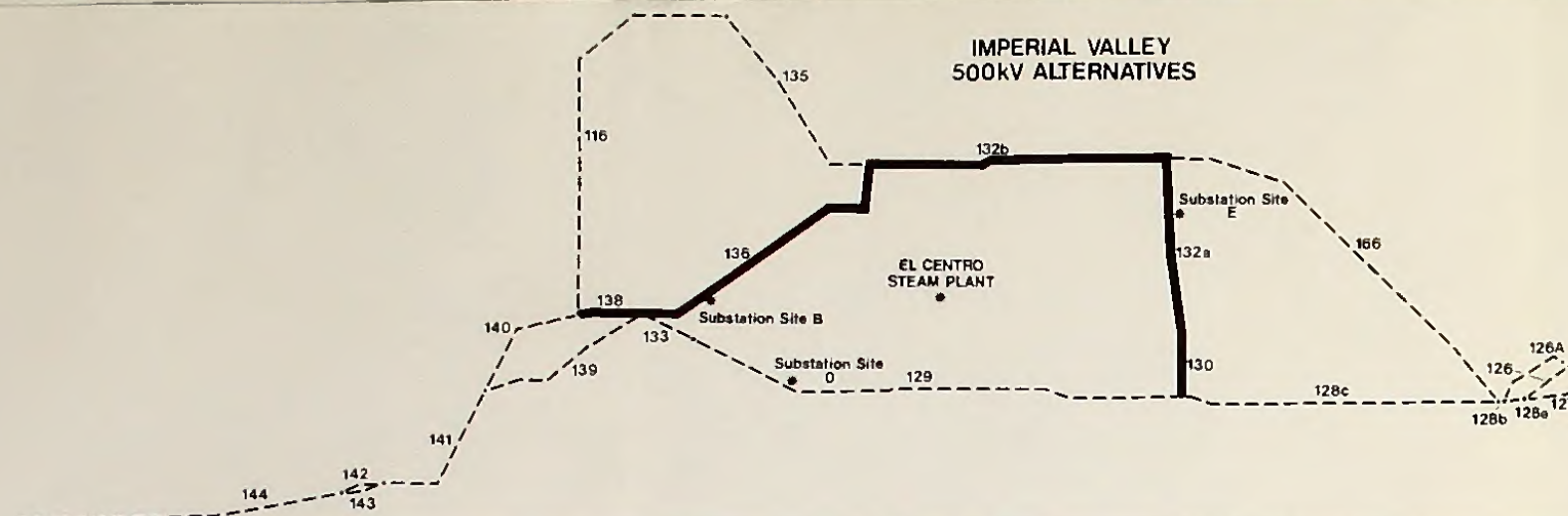
161kV

The 161kV line proceeds north from Site D, crossing the Westside Main Canal before turning east at the junction of Fern Levee and the Fig Canal. The route then turns north at the Warmwood Drain, crosses the New River and turns east to follow the Elder Lateral before turning north at the Elder Drain. After another minor jog the alignment follows the Central Drain, passing north of El Centro, before turning south and entering the IID substation located on the east side of El Centro.

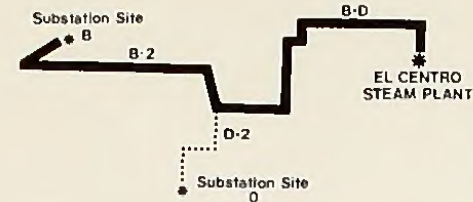
TABLE 3-9(R)

SET OR CONNECTOR	ALT. ROUTE	LENGTH OF ROUTE	ENVIRONMENTAL CONSEQUENCES											ESTIMATED COSTS	
			GEOTECHNICAL FEATURES	ECOLOGICAL RESOURCES	SOCIAL AND ECONOMIC LAND USES	AGRICULTURAL RESOURCES	PARK, PRESERVATION AND RECREATION LAND USES	VISUAL CHARACTERISTICS	ARCHAEOLOGICAL RESOURCES	HISTORICAL RESOURCES	NATIVE AMERICAN CULTURAL RESOURCES	AGENCY / PUBLIC COMMENTS	SUMMARY		
IX(R)	*Rt. 1 500kV (Links 129, 131, 138)	40.9	L	L-M Crosses 14.6 miles of flat-tailed horned lizard habitat.	L Highly impacts 2 single-family dwellings.	M Crosses 22.4 miles, removing 10.14 acres.	L-M Crosses ORV restricted area.	H-M High sensitivity of residences in agricultural lands; structures contrast.	M	L	L-M Crosses multiple resource area.	2	Concern for visual impacts to residences, expansion of urban area, interference with agricultural operations, and crossing of I-8. Preferred route of California Fish and Game.	The preferred alternative for Imperial Valley - Route 1 - can be characterized as having low-to-moderate cumulative impacts. Among the three alternatives considered, Route 1 is cumulatively preferred for all resources except agricultural and historical. The 500kV route associated with this alternative is preferred for all resources except agricultural and historical. The 161kV route is preferred for all resources except agricultural and archaeological. While Substation D is not the preferred substation site, the preferences for the 500kV and 161kV routes result in a cumulative preference for Route 1.	13,231,000
	Substation D	1 square mile	M	M Flat-tailed horned lizard habitat.	L 2	N	M-L Crosses Yuha Basin restricted area.	M Moderate structures contrast.	M-H	L	N	-	Considered to be the most reasonable substation site by IID.	Route 1 is the second cumulative choice for agricultural and historical resources. Route 1 would remove 1.92 acres and cross 4.88 more miles of agricultural land than the preferred agricultural alternative (3). Only a marginal difference in impact would occur between Route 1 and the preferred historical alternative.	45,000,000
	161kV (Links D-2, B-D)	17.5	L	M-H Bird-collision hazard because of nearby rookery.	L-M Potentially impacts 15 single-family dwellings and 1 commercial structure.	M Crosses 1.78 miles, removing 0.38 acres.	L Crosses 0.3 mile of restricted DRV area.	L Structures contrast.	L-M	L-M	L	2		Significant unavoidable adverse impacts would occur for ecological, agricultural, and visual resources and socioeconomic land use with the 500kV route. Significant unavoidable adverse impacts would occur with the 161kV route for ecological and agricultural resources, socioeconomic land use, and park, preservation and recreation land uses.	3,775,000
	Cumulative		L-M Comparative route preferences are based on impacts associated with alternative 500kV routes. The least amount of soil disturbance would occur along Route 1.	M The routing location of alternative 500kV lines is key to preference ranking among alternatives for Set IX(R). Route 1 would have fewer high impacts and cross the least amount of sensitive species habitat.	L Routing preference is determined by the location of the 500kV route and, to a lesser extent, the location of the 161kV line. The 500kV route associated with this system is preferred because fewer single-family dwellings would be affected. The 161kV line of Route 1 is preferred to Route 2 for the same reason.	M The 500kV alignment of Route 1 would cross more miles of agricultural land than the agriculturally preferred Route 3. In addition, the Route 1 system would include impacts resulting from the 161kV line.	L-M Cumulative preference ranking is based on the location of both the 500kV route and the 161kV route. Route 1 is preferred despite low preference for Substation D. While 500kV preference is equal for Routes 1 and 2, Links B-2, B-D are preferred for 161kV alternatives.	M-L The location of alternative 500kV routes determines cumulative preference. Route 1 is preferred despite a preference for Substation E and no additional impact from the 161kV line on Route 3. All three 500kV alternatives are similarly characterized and would have significant unavoidable adverse impacts. Route 1 is preferred because the shorter route would have the least significant unavoidable adverse impacts.	M Cumulative preference is based on the location of the 500kV route. Route 1 would have the least amount of high impacts of the three alternative 500kV routes, and is preferred, despite the lower preference for the associated 161kV line.	L-M Cumulative preference is based upon the location of the 500kV route.	L-M The location of the 500kV route established cumulative preference. Route 1 is preferred because fewer unavoidable adverse impacts would occur.			62,006,000	

* Environmentally Preferred Route



ALTERNATIVE 161kV TRANSMISSION SYSTEM



SET IX(R) - Route 2 - Imperial Valley

Route 2 proceeds north for approximately 16 miles, parallels the East Highline Canal, turns west paralleling the Holtville Drain, crosses Highways 115, 141 and 86, and the Alamo and New rivers. Approximately one mile west of the New River the route turns south and southwest before turning west one mile east of Plaster City. The route proceeds west for approximately six miles before ending at the base of the Coyote Mountains.

Substation B

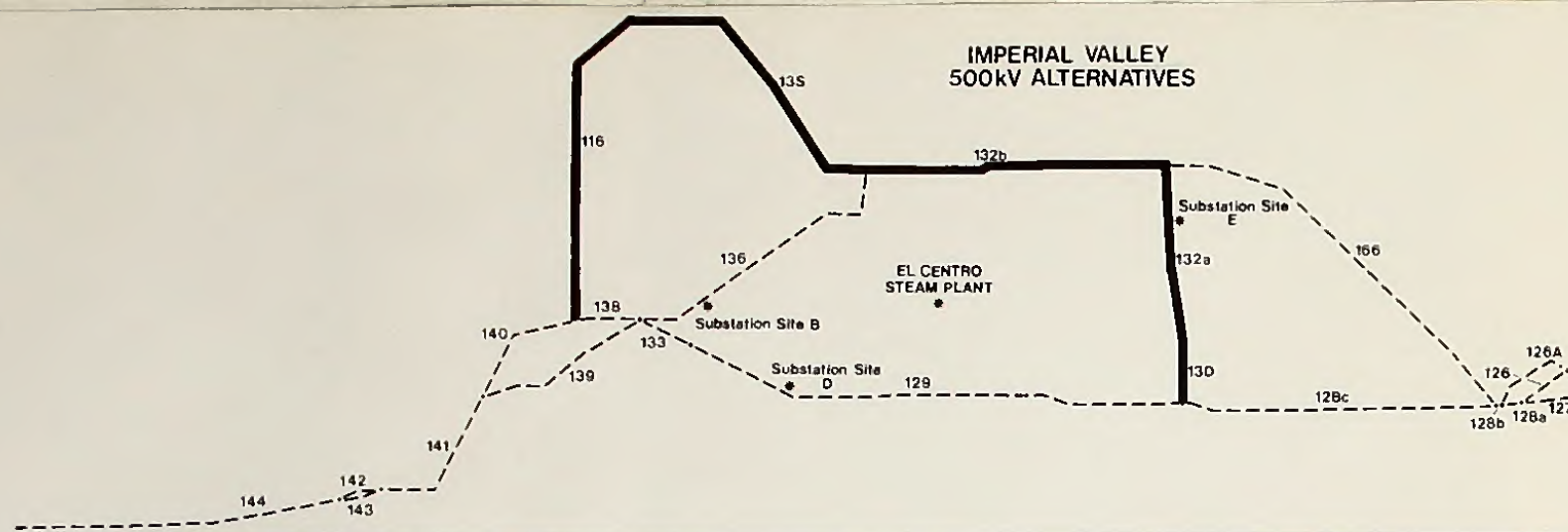
Substation Site B is located on Coyote Wash, one mile north of Highway 80 and approximately three miles northeast of Plaster City.

161kV

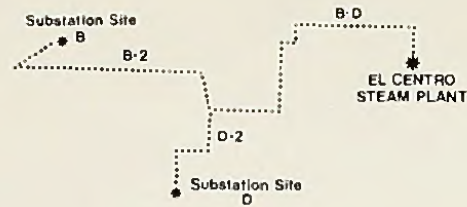
The 161kV line proceeds southwest from Substation Site B for approximately two miles before crossing Highway 80. The route then turns west, parallels Highway 80 and, after crossing the New River, turns south crossing I-8 before turning west at the Elder Lateral. The route then follows the Elder Lateral before turning north at the Elder Drain. After a minor jog, the alignment follows the Central Drain, passing north of El Centro before turning south and entering the IID substation located on the east side of El Centro.

TABLE 3-9(R)

SET OR CONNECTOR	ALT ROUTE	LENGTH OF ROUTE	ENVIRONMENTAL CONSEQUENCES										ESTIMATED COSTS	
			GEOTECHNICAL FEATURES	ECOLOGICAL RESOURCES	SOCIAL AND ECONOMIC LAND USES	AGRICULTURAL RESOURCES	PARK, PRESERVATION AND RECREATION LAND USES	VISUAL CHARACTERISTICS	ARCHAEOLOGICAL RESOURCES	HISTORICAL RESOURCES	NATIVE AMERICAN CULTURAL RESOURCES	AGENCY/PUBLIC COMMENTS		SUMMARY
IX (R) cont.	Rt. 2 500kV (Links 130, 132a, 132b, 136, 138)	58.8	L 2	M-L 2 Crosses 2.6 miles of special-status desert riparian habitat; crosses 19.7 miles of flat-tailed horned lizard habitat; crosses Yuma clapper rail habitat.	L 2 Highly impacts 3 single-family dwellings.	M 3 Crosses 28.4 miles, removing 14.9 acres.	L-M 1 Crosses ORV restricted area.	H-M 2 High sensitivity to residences in agricultural lands; structures contrast.	M-H 2 Crosses area identified by BLM as having "very high" sensitivity.	N 1	L-M 2 Crosses multiple resource area; visible from 4 sites.	Concern for visual impacts, agricultural operations, aircraft hazard (U. S. Navy), and endangered species (Yuma clapper rail).	Route 2 can be characterized as having moderate cumulative impacts. Resource impact characterizations for the 500kV alignment associated with Route 2 are slightly higher than characterizations for the preferred route (particularly for ecological and archaeological resources). Route 2 would have the most significant agricultural impacts of the three alternatives considered for the Imperial Valley. Significant unavoidable adverse impacts identified for the 500kV route include predicted impacts to ecological, agricultural, visual, archaeological, and Native American cultural resources and socioeconomic land use. The 161kV line would have significant unavoidable adverse impacts to ecological and agricultural resources, socioeconomic land use, and park, preservation and recreation land uses.	18,986,000
	Sub-station B	1 square mile	M 2	M-L 1 Flat-tailed horned lizard habitat.	L 2	N -	L 1	M 2 Moderate structures contrast.	M-H 1	L -	N -	45,000,000		
	161kV (Links B-2, B-D)	24.2	L 2	M-H 2 Bird collision hazard because of rookery.	L-M 2 Potentially impacts 31 single-family dwellings and 2 commercial structures.	M 1 Crosses 1.77 miles, removing 0.22 acre.	L 2 Crosses 5 miles of restricted ORV area.	L-M 2 Structures contrast and high visibility near area residences.	L 1	L-M 2	L 2	3,430,000		
	Cumulative		L-M 2 See Route 1.	M 2 The 500kV route associated with this system would cross more miles of good habitat and affect more sensitive species than the ecologically preferred route.	L 2 The 500kV and 161kV routes are the second choice among the alternatives considered.	M 3 Route 2 would affect more miles of agricultural land than either Route 1 or Route 2.	L-M 2 Route 2 would have more miles of significant unavoidable adverse impacts along the 161kV route than the preferred Route 1. The preference for Substation B does not counterbalance the additional miles of impact.	M 2 Both the 500kV and 161kV routes receive second preference of the alternatives considered. Route 2 would have more significant unavoidable adverse impacts than Route 1 and fewer impact than Route 3.	M-H 2 Route 2 is less preferable than Route 1 because more miles of high impact are predicted and a significant unavoidable adverse impact would occur.	L-M 1 The 500kV route associated with this system would not impact historic resources. Because preference ranking is based upon impacts associated with 500kV routes, Route 2 is preferred for historic resources.	L-M 2 While impact characterizations are identical for Routes 1 and 2, more significant unavoidable adverse impacts would occur on the 500kV route associated with this system.	67,416,000		



ALTERNATIVE 161kV TRANSMISSION SYSTEM



SET IX (R) - Route 3 - Imperial Valley

Route 3 proceeds north for approximately 16 miles, parallels the East Highline Canal, before turning west paralleling the Holtville Drain, crossing Highways 115, 111 and 86, and crosses the Alamo and New rivers. Approximately four miles west of the New River the route turns northwest and parallels an existing transmission line for 12 miles before turning west crossing the NPTR, then turning southwest proceeding in this direction for four miles before heading south. The route again crosses the NPTR, passes east of the Fish Creek Mountains, crosses Carizzo Wash and ends at the base of the Coyote Mountains.

Substation Site E

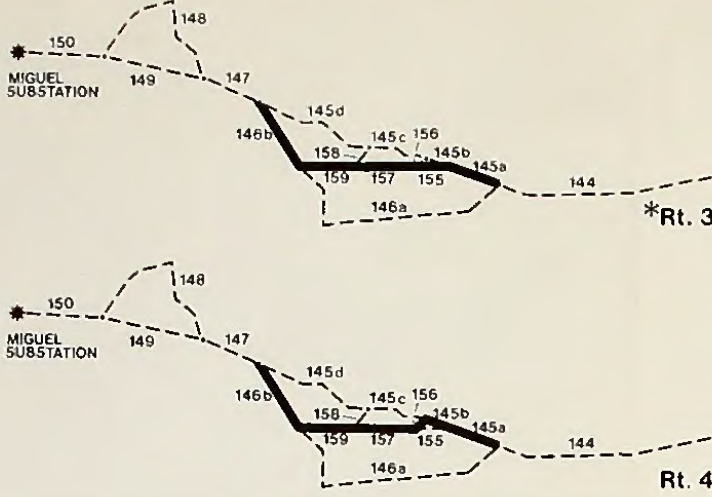
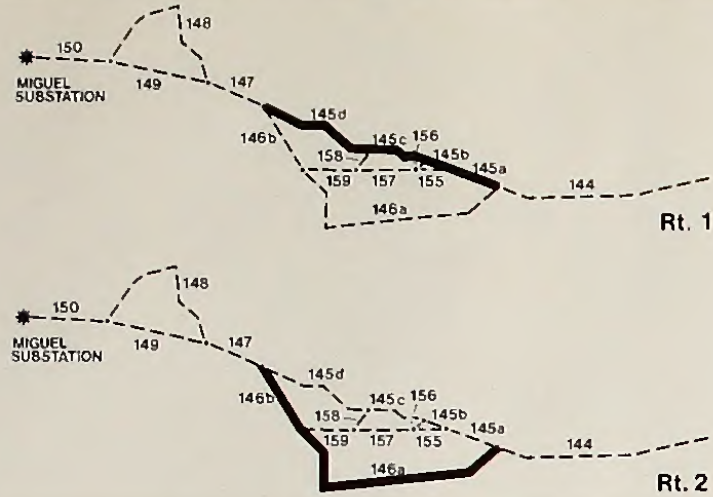
Substation Site E is located on the East Mesa, east of the East Highline Canal and six miles northeast of Holtville.

161kV

Substation Site E would utilize the Imperial Valley Geothermal Collection System, therefore no 161kV transmission line is required.

TABLE 3-9(R)

SET OR CONNECTOR	ALT. ROUTE	LENGTH OF ROUTE	ENVIRONMENTAL CONSEQUENCES										ESTIMATED COSTS	
			GEOTECHNICAL FEATURES	ECOLOGICAL RESOURCES	SOCIAL AND ECONOMIC LAND USES	AGRICULTURAL RESOURCES	PARK, PRESERVATION AND RECREATION LAND USES	VISUAL CHARACTERISTICS	ARCHAEOLOGICAL RESOURCES	HISTORICAL RESOURCES	NATIVE AMERICAN CULTURAL RESOURCES	AGENCY / PUBLIC COMMENTS		SUMMARY
IX(R) cont.	Rt. 3 500kV (Links 130, 132a, 132b, 135, 116)	76.8	L 3	M-L 3 Crosses 2.6 miles of special-status desert riparian habitat; crosses flat-tailed horned lizard habitat; crosses Yuma clapper rail habitat. Significant waterfowl collision hazard south of Salton Sea.	L-M 3 Highly impacts 3 single-family dwellings.	M 1 Crosses 19.3 miles, removing 8.6 acres.	M-L 2 Crosses ORV restricted area.	H-M 3 High sensitivity to residences in agricultural lands; strong structures contrast.	H 3 Crosses 2 major areas identified by BLM as areas of "very high" sensitivity; proposed ACEC.	M-H 3 Crosses traces of Southern Emigrant Trail.	M-H 3 Crosses multiple resource area; visible to 4 sacred places and 4 other sites.	Concern for visual impacts, agricultural operations, aircraft hazard (U.S. Navy), and endangered species (Yuma clapper rail).	Moderate-to-high cumulative impacts characterize Route 3. Route 3 is significantly longer than Routes 1 and 2 and is the third cumulative preference for all resources except agriculture. Low preference for this alternative is a result of higher resource impact characterizations for most resources on the 500kV route. Route 3 does not include a 161kV line; the location of Substation E affords the utilization of the Imperial Valley Geothermal Collection System. Therefore, while Route 3 would avoid additional miles of impact associated with the 161kV line, the higher impact characterizations predicted for the 500kV route account for the low preference assigned to this system.	24,961,000
	Sub-station E	1 square mile	M 1	M 2 Special-status desert riparian habitat; flat-tailed horned lizard habitat.	N 1 Restricted ORV area.	N -	L 2	L 1 Moderate structures contrast.	M-H 2	L -	N -		Route 3 is preferred for agricultural resources due to the fewer miles of agricultural lands that would be disturbed by the 500kV and 161kV routes. However, impacts to archaeological, historic, and Native American resources would be significantly greater for this 500kV route than the other routes considered.	45,000,000
	Cumulative			L-M 3 See Route 1.	M 3 Route 3 is least preferable because it would cross more miles of good habitat and affect more sensitive species than either Routes 1 or 2. The absence of 161kV line with the system does not affect the cumulative preference for alternative systems.	L-M 3 The 500kV route of this system has a higher impact characterization than either Routes 1 or 2; thus, it is the least preferable alternative route (despite preference for Substation E).	M 1 Route 3 would affect the least amount of agricultural land of the 3 alternatives and is, therefore, the preferred route for agricultural resources.	M-L 3 This 500kV alignment is the least preferable due to the additional miles of significant unavoidable adverse impacts that would occur. Despite no additional predicted impact from the 161kV line, Route 3 is the least preferable system for Set IX(R).	M 3 The 500kV route associated with this system is least preferred. Despite a preference for Substation E, and no impacts resulting from the 161kV line, Route 3 is the least preferable alternative system for Imperial Valley.	H 3 Route 3 is least preferable alternative because of the miles of high impact predicted and amount of significant unavoidable adverse impacts.	M 3 More significant impact would occur with this 500kV alignment than either Routes 1 or 2. In addition, a significant unavoidable adverse impact would occur with this routing.	M 3 Route 3 is the least preferable due to the high impacts predicted and the significant unavoidable adverse impacts identified for the 500kV route.		69,961,000



TECATE PEAK
500KV ALTERNATIVES

TABLE 3-9(R)

SET XI(R) - Route 1 - Tecate Peak

Route 1 begins approximately 1.0 mile north of Tecate, angling west-by-northwest for its entire length. The route crosses north of Barrett Junction, north of Engineer Springs and south of Dulzura before joining Link 147.

SET XI(R) - Route 2 - Tecate Peak

Route 2 angles southwest passing north of Tecate before turning west and paralleling the International Border. In Marron Valley the route turns north for approximately 1.5 miles then turns northwest proceeding in this direction until joining Link 145.

*SET XI(R) - Route 3 - Tecate Peak

The preferred route begins approximately 1.0 mile north of Tecate, angling at a west-by-northwest direction for 2.5 miles before turning west. The preferred route proceeds in this westerly direction for approximately 6.5 miles crossing Highway 94 south of Barrett Junction and Cottonwood Creek and passing north of Little Tecate Peak. The route turns in a northwesterly direction after crossing Marron Valley following Sycamore Canyon for the last mile before joining Link 145.

SET XI(R) - Route 4 - Tecate Peak

Route 4 begins approximately 1.0 mile north of Tecate, angling west-by-northwest for 3.5 miles before turning southeast for 0.5 mile before turning west. Route 4 proceeds west for approximately 5.0 miles crossing Highway 94, south of Barrett Junction and Cottonwood Creek and passing north of Little Tecate Peak. Route 4 turns northwest after crossing Marron Valley following Sycamore Canyon for the last mile before joining Link 145.

SET XI(R) - Route 5 - Tecate Peak

Route 5 begins north of Tecate, angling west-by-northwest for approximately 6.0 miles turning southeast, then west of Little Tecate Peak and proceeds in this direction for approximately 2.5 miles. The route turns in a northwesterly direction, after crossing Marron Valley, and proceeds in this direction until joining Link 145.

SET OR CONNECTOR	ALT. ROUTE	LENGTH OF ROUTE	ENVIRONMENTAL CONSEQUENCES										ESTIMATED COSTS						
			GEOTECHNICAL FEATURES	ECOLOGICAL RESOURCES	SOCIAL AND ECONOMIC LAND USES	AGRICULTURAL RESOURCES	PARK, PRESERVATION AND RECREATION LAND USES	VISUAL CHARACTERISTICS	ARCHAEOLOGICAL RESOURCES	HISTORICAL RESOURCES	NATIVE AMERICAN CULTURAL RESOURCES	AGENCY / PUBLIC COMMENTS		SUMMARY					
XI(R)	Rt. 1 (Links 145a, 145b, 145c, 145d)	11.7	L	1 H-M Crosses 10.6 miles special-status plant habitat; crosses 10.8 miles of raptor habitat.	L	3 (47 dwellings within 1/4 mile of ROW.)	N	-	L	1 Crosses proposed National Natural Landmark.	H-M	2 High scenic quality; structures, land form, and vegetation contrast.	M-L	1 Crosses area with recorded sites.	L-M	3 M Visible from 2 sacred places; crosses contemporary village area.	Dulzura property owners - concern for visual and land use impacts.	Slight differences in resource impact characterizations exist among the five routes considered. All routes can be generally characterized as having moderate-to-high impacts. Significant unavoidable adverse impacts are predicted for most resources on all five routes. None of the routes would affect agricultural resources. Route 3 is the preferred route for socioeconomic land use. Route 3 would have less impact upon visual and historic resources and park, preservation and recreation land uses than three of the other four alternative routes; however, Route 3 is the least preferred alternative for archaeological resources. Route 3 is preferred since it would affect nine single-family dwellings within 1/4 mile of the ROW versus Route 1, which would affect 47 single-family dwellings.	4,253,000
	Rt. 2 (Links 146a, 146b)	14.8	L	5 H-M Crosses 14.5 miles of special-status plant habitat; crosses 6.2 miles of raptor habitat.	L	2 (14 dwellings within 1/4 mile of ROW.)	N	-	M	3 Crosses Coachman Experimental Forest; crosses proposed National Natural Landmark. Crosses 0.6 mile of restricted ORV area.	H-M	5 High scenic quality; structures, land form, and vegetation contrast; sensitivity to proposed National Natural Landmark.	M-H	3 Crosses area with high probability of sites.	L	1 M-H Crosses sacred Tecate Peak and contemporary village area.	Tecate Planning Group - concern for visual impacts. U. S. Border Patrol - interference with border monitoring devices. Individual property owners - use public lands and stay along International Border.		5,380,000
	*Rt. 3 (Links 145a, 155, 157, 159, 146b)	12.4	L	2 H-M Crosses 9.7 miles of special-status plant habitat; crosses 12.2 miles of raptor habitat.	L	1 (9 dwellings within 1/4 mile of ROW.)	N	-	L	2 Crosses proposed National Natural Landmark.	H-M	3 High scenic quality; strong structures and land form contrast.	M-H	4 Crosses contemporary village area.	L	2 See comments Route 1.	2,635,000		
	Rt. 4 (Links 145a, 145b, 156, 157, 159, 146b)	12.6	L	3 H-M Crosses 10.0 miles of special-status plant habitat; crosses 12.0 miles of raptor habitat.	L	3 (9 dwellings within 1/4 mile of ROW.)	N	-	L	2 Crosses proposed National Natural Landmark.	H-M	1 High scenic quality; strong structures contrast.	M	2 Crosses contemporary village area.	M-L	4 See comments Route 1.	2,928,000		
	Rt. 5 (Links 145a, 145b, 145c, 158, 159, 146b)	13.0	L	4 H-M Crosses 11.8 miles of special-status plant habitat; crosses 12.1 miles of raptor habitat.	L	3 (27 dwellings within 1/4 mile of ROW.)	N	-	L	2 Crosses proposed National Natural Landmark.	H-M	4 High scenic quality; strong structures contrast.	M	2 Crosses contemporary village area.	M-L	4 See comments Route 1.	3,708,000		

*Environmentally Preferred Route

occurrence were considered. Thresholds provide a means for identifying impact intensities that would be considered significant by some affected interest. Priorities provide criteria for assigning relative importance to thresholds, while likelihood estimates supply the probability that an environmental impact will exceed a certain threshold.

Thresholds - An impact is perceived as significant by some affected interest (someone or something) when the amount of impact exceeds a threshold. Thresholds are established by affected interests from respective viewpoints or value systems. Affected interests may be society as a whole, an individual or group, or the tolerance of the ecosystem itself. Different affected interests hold different values that influence their respective viewpoints, shape opinions, attitudes and behavior, and judgment about what is significant.

Priorities - Priorities may be established by law, regulation, or other factors beyond the decision-maker's control, by prior commitments, by professional expertise or by a decision-maker using his best judgment. Priorities used in determining significant unavoidable adverse impacts for the proposed Project were defined as follows:

1. Highest priority - Threshold established by law or regulation. Not likely to change, absolute. Threshold may not be exceeded under any circumstances.
2. Very high priority - Minimum- or maximum-constraint thresholds consistent with sound planning and resource use. Usually determined by, or concerned with, functional values of the ecosystem (with man as component). Thresholds rarely subject to change, and only in the light of new information. Should rarely be exceeded. Includes uncertainties and risks which, if misjudged, could result in major or massive irreversible and irretrievable effects on the ecosystem.
3. High priority - Thresholds usually established by normative values that are not formally codified in legal requirements, but which clearly carry the force of public opinion sufficient to delay or halt the action if ignored. Also includes thresholds that deal with uncertainties and moderate risks to the functioning of the ecosystem within different contexts.
4. Moderate priority - Thresholds that are highly visible or controversial preference values. These might be, or could become, normative values (borderline norms). These thresholds reflect major concerns by an often small, but influential, affected interest. This priority also includes functional thresholds with low risks to the ecosystem.
5. Low priority - Thresholds that are preference values of individuals and groups.

Likelihood Estimates - Likelihood estimates fall into three categories.

High Likelihood - Greater than 50 percent chance of occurrence (probability greater than 0.5).

Low Likelihood - Less than (or equal to) 50 percent but at least a 5 percent chance of occurrence.

Negligible - less than 5 percent chance of occurrence (probably less than 0.05).

Using the above factors, significant unavoidable adverse impacts for the proposed Project were identified and are displayed (Table 3-9(A)) in a manner that facilitates comparisons of environmental consequences associated with each alternative route.

At one level, any irreversible or irretrievable impact is significant. For example, although no significant adverse unavoidable impacts were identified for geotechnical features, Project construction along almost any route would result in an irreversible acceleration of the rate of soil erosion on a localized basis. However, when compared to the rates and amounts of erosion presently occurring in the study area because of both natural and other man-caused activities, the erosional impacts are judged to be low to moderate, and consequently, not "significant" relative to the proposed Project.

General guidelines for interpreting "significant unavoidable adverse impacts" assessed for each resource category are as follows:

<u>Resource Category</u>	<u>Significant Unavoidable Adverse Impact</u>
Geotechnical Features	Sets in motion major erosional processes in relatively stable soil areas.
Ecological Resources	Potentially eliminates or highly stresses local populations of unique, special-status and/or protected (e.g., threatened and endangered plants) species of flora and fauna.
Social & Economic Land Uses	Dislocates or permanently modifies current or planned land-uses or activities, or substantively conflicts with stated management policies.
Agricultural Resources	Displaces farmland for life of Project.
Park, Preservation and Recreational Land Uses	Substantively conflicts with park, preservation and recreation values, or stated management policies.

<u>Resource Category</u>	<u>Significant Unavoidable Adverse Impact</u>
Visual Characteristics	Substantially modifies integrity of visual setting or scenic resources.
Archaeological Resources	Affects known resources possessing special or legal status; e.g., National Register or eligible for National Register. (As the impact assessment of archaeological resources was predicated on a predictive data-base, some significant unavoidable adverse impacts to specific properties would not be known until after the Phase III cultural surveys.)
Historical Resources	Affects known resources possessing special or legal status; e.g., National Register or eligible for National Register. Affects integrity of specific properties possessing significant historical values.
Native American Cultural Resources	Potentially conflicts with Native American religious or social activities, or integrity of resources associated with such activities.

N.B. Agricultural data on Table 3-9(R) does not always agree with agricultural data in Chapter 4 because the data developed for Table 3-9(R) is site-specific while the data in Chapter 4 is inventory data at corridor scale.

Routing Preference by Resource Category

Based upon review of generalized impact-levels, significant unavoidable adverse impacts and other pertinent descriptive (Chapter 4) and impact (Chapter 5) data, each route was ranked for each resource in order of preference, first (1) preference indicating least potential impact on that resource, second (2) preference indicating next highest impact, etc. Preference ratings are shown in the upper right-hand corner of each resource data-block.

Agency/Public Comments

Route-specific comments provided by agencies and the public, during the public hearings and letters responding to adequacy of the DES relevant to decision-making are shown for each routing alternative.

Identification and Description of Environmentally Preferred Route

In order to determine routing preferences, BLM and the resources study-team that had conducted the Phase II Corridor Studies participated in a workshop. The study team summarized the cumulative environmental consequences for each route from impact characterizations, significant unavoidable adverse impacts, individual routing-preferences according to specific resources, and agency/public comments. The least potential-impact or "environmentally preferred" routes were then identified from the cumulative environmental consequences, taking into account the particular Project components relevant to each route, (e.g., 500kV transmission line, substation, 161kV transmission system, 69kV transmission system). Ranking of the routes was accomplished in the following manner.

If there was obvious agreement, or preference, for a route, the route was assigned a rank by consensus of the study team.

If there was disagreement about ranking routes, the study team first examined the impact characterization of the routes to determine whether the difference in impacts to specific resources associated with preference ranking was marginal or important.

For example, the impact characterization for archaeological resources might be low for one route but high for another, while the impact characterization for ecological resources might be low for both routes. If impact characterizations for all other resources were equal, preference would then be given to the route with the low ecological and archaeological impacts.

If a consensus could not be reached about ranking routes after examining impact characterizations for specific resources, then the study team examined the differences among significant unavoidable adverse impacts to the various resources in terms of preestablished priorities (as defined above under Significant Unavoidable Adverse Impacts).

Identification of Environmentally Preferred Route

For the SDES the environmentally preferred route was identified for five geographic areas. It is important to note that two environmentally preferred routes were chosen in the Yuma area. Each route reflects a different set of values, or point of view, in trade-offs between resources. The southern preferred alternative represents the route with the least cumulative environmental consequences. The northern preferred alternative responds to public concerns expressed and gives greater significance to land-use conflicts and agricultural impacts. The following presents the SDES environmentally preferred route(s):

Yuma -

South: Set XIV Route 2 (Links 36, 37, 38, 43, 56, 59, 60, 62, 63, 65, 67, 68, 70, 124a, 124b, 125)

North: Set XIV Route 6 (Links 36, 37, 40a, 40b, 41, 48, 49, 51, 101, 108, 110a, 165, 162, 163, 164, 134)

Sand Hills - Set XV Route 1 (Link 126A)

Imperial Valley - Set IX(R) Route 1 (Links 129, 133, 138)

Dulzura - Set XI(R) Route 3 (Links 145a, 155, 157, 159, 146b)

Miguel-Mission Tap - Connector N (Link 151)

The complete DES environmentally preferred route and the complete SDES environmentally preferred route (with southern and northern routing options at Yuma) are shown in Table 3-8d and Figure 3-15(R).

Description of the Environmentally Preferred Route

PVNGS to Yuma

In Arizona, the preferred route, originating at PVNGS, would proceed generally in a southwesterly direction through the Sonoran Desert landscape of the Basin and Range Province. The route would parallel the Southern Pacific Railroad and traverse isolated parcels of agricultural land, the foothills of the Gila Bend Mountains, Dendora Valley, pass between Oatman and Face mountains and continue through the basin of Hyder Valley. The preferred route would proceed through the basin/bajada landscape, typical of the area north of the Gila River, then skirt the southern edge of the Muggins Mountains.

While the environmental consequences along the Arizona portion of the proposed preferred route can generally be characterized as moderate-to-low, there remain some significant unavoidable adverse impacts. The preferred route would traverse areas of moderate-to-high natural scenic quality and be visible (in close proximity) from residences and portions of I-8. Visual impacts would result from structures contrast (no existing structures similar to those of the proposed Project) and landform contrasts. The preferred route would pass through special-status plant habitats (11.0 miles) and the habitat of the Gila monster. Of the approximately 8.5 miles of agricultural land crossed, approximately 3.6 acres would be eliminated from productive use. One airstrip would be traversed, and four single-family dwellings could be highly impacted. Cultural-resource sites important to Native Americans would be affected by this route and previously recorded archaeological sites may be crossed.

Yuma

Arizona Southern - The southern environmentally preferred route would cross the Gila River, skirt the Gila Mountains, circumvent the City of Yuma to the south, cross the Yuma Mesa, and traverse the Yuma Valley before heading north to cross the Colorado River.

While the environmental consequences along the southern portion of the proposed preferred route can generally be characterized as moderate-to-high, there remain some significant unavoidable adverse impacts. The preferred route would be visible (in close proximity) from residences. Visual impacts would result from structures contrast (no existing structures similar to those of the proposed Project). The preferred route would impact habitat of the flat-tailed horned lizard. Of the approximately 17.8 miles of agricultural land crossed, approximately 7.1 acres would be eliminated from productive use. Two housing subdivisions and one airstrip would be traversed, and 22 single-family dwellings could be highly impacted. Cultural-resource sites important to Native Americans would be affected by this route.

Arizona Northern - The northern environmentally preferred route would cross the Gila River before turning north to skirt the west side of the Laguna Mountains and then west to cross the Colorado River just below the Laguna Dam, circumventing the City of Yuma to the north.

While the environmental consequences along the northern portion of the proposed preferred route can generally be characterized as moderate-to-high, there remain some significant unavoidable adverse impacts. The preferred route would traverse areas of moderate-to-high natural scenic quality and be visible (in close proximity) from residences. Visual impacts would result from structures contrast (no existing structures similar to those of the proposed Project) and landform contrasts. The preferred route would cross the Colorado River (potential bird collision hazard). Of the approximately 2.0 miles of agricultural land crossed, approximately 1.0 acre would be eliminated from productive use. Cultural-resource sites important to Native Americans would be affected by this route.

California Southern - The southern route would proceed generally in a westerly direction from the Colorado River, crossing the southern tip of the Fort Yuma (Quechan) Indian Reservation, south of Pilot Knob.

The southern portion of the environmentally preferred route can generally be characterized as having moderate-to-high environmental consequences with several significant unavoidable adverse impacts. The route would traverse areas of moderate-to-high natural scenic-quality. Visual impacts resulting from structures contrast and landform contrast are predicted for this route. The preferred route would pass through 0.2 mile of Colorado River habitat, and cross one area of park, preservation or recreation land-use. The route would also traverse an area of archaeological, historical and Native American concern designated as an ACEC by the BLM.

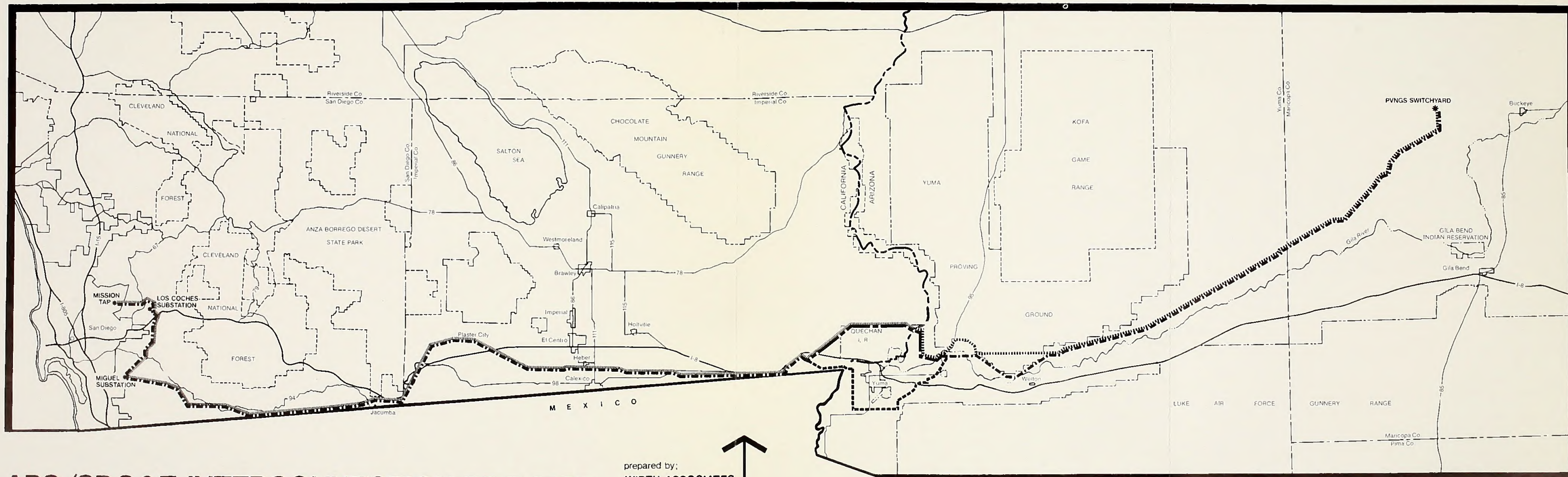
California Northern - The northern route after crossing the Colorado River would proceed in a westerly direction crossing the Picacho Basin and turn southwest at the base of the Cargo Muchacho Mountains before entering the Sand Hills.

TABLE 3-8d
DES/SDS ENVIRONMENTALLY PREFERRED ROUTES

DES Environmentally Preferred Route	SDS Environmentally Preferred Route South	SDS Environmentally Preferred Route North
Set I Route 3 (Links 2, 3, 5, 6,)	Set I Route 3 (Links 2, 3, 5, 6)	Set I Route 3 (Links 2, 3, 5, 6)
Connector C (Link 7)	Connector C (Link 7)	Connector C (Link 7)
Connector E (Links 23, 26)	Connector E (Links 23, 26)	Connector E (Links 23, 26)
Set III Route 4 (Links 29, 30a, 30b, 36, 37)	Set XIII Route 2 (Links 29, 30a, 30b)	Set XIII Route 2 (Links 29, 30a, 30b)
Set V Route 3 (Links 38, 43)	Set XIV Route 2 (Links 36, 37, 38, 43, 56, 59, 60, 62, 63, 65, 67, 68, 70, 124a, 124b, 125)	Set XIV Route 6 (Links 36, 37, 40a, 40b, 41, 48, 49, 51, 101, 108, 110a, 165, 162, 163, 164, 134)
Connector G (Link 56)	Set XV Route I (Link 126A)	Set XV Route I (Link 126A)
Set VI Route 2 (Links 59, 60)	Connector I(R) (Links 128b, 128c)	Connector I(R) (Links 128b, 128c)
Connector H (Links 62, 63)	Set IX(R) Route I (Links 129, 133, 138)	Set IX(R) Route I (Links 129, 133, 138)
Set VII Route 3 (Links 65, 67, 69)	Connector J (Links 140, 141)	Connector J (Links 140, 141)
Set VIII Route 3 (Links 123, 134, 126)	Set X Route I (Link 142)	Set X Route I (Link 142)
Connector I (Link 128)	Connector K (Link 144)	Connector K (Link 144)
Set IX Route I (Links 129, 133, 138)	Set XI(R) Route 3 (Links 145a, 155, 157, 159, 146b)	Set XI(R) Route 3 (Links 145a, 155, 157, 159, 146b)

Table 3-8d (continued)
DES/SDES Environmentally Preferred Routes

DES Environmentally Preferred Route	SDES Environmentally Preferred Route South	SDES Environmentally Preferred Route North
Connector J (Links 140, 141)	Connector L (Link 147)	Connector L (Link 147)
Set X Route 1 (Link 142)	Set XII Route 2 (Link 149)	Set XII Route 2 (Link 149)
Connector K (Link 144)	Connector M (Link 150)	Connector M (Link 150)
Set XI Route 1 (Link 145)	Connector N (Link 151)	Connector N (Link 151)
Connector L (Link 147)		
Set XII Route 2 (Link 149)		
Connector M (Link 150)		
Connector N (Link 151)		



APS/SDG&E INTERCONNECTION PROJECT

PREFERRED ROUTES

- Environmentally Preferred
- North
- ... South
- ~~~~~ Applicant Preferred
- - - - - BLM Preferred

prepared by;
WIRTH ASSOCIATES
 0 miles 5 10 15 20

Figure 3-15(R)

The northern portion of the environmentally preferred route can generally be characterized as having moderate-to-high environmental consequences with several significant unavoidable adverse impacts. The route would traverse areas of moderate-to-high natural scenic-quality. Visual impacts resulting from structures contrast and landform contrast are predicted for the route. The preferred route would pass through 0.2 mile of Colorado River habitat, and cross several areas of park, preservation or recreation land-use. The route would also traverse areas of archaeological concern designated by BLM as having "very high" sensitivity. Numerous cultural-resource sites of Native American concern would be potentially affected.

Sand Hills-Mission Tap

The preferred route would traverse the Colorado Desert, Salton Trough and Peninsular sections of two physiographic provinces. The route would cross the southern portion of the Algodones Dunes (Sand Hills) and agricultural land of southern Imperial Valley. Continuing west, the preferred route would traverse In-Ko-Pah Gorge and Mountain Springs Grade and proceed into heavily vegetated rocky hills and valleys west of Imperial Valley, generally paralleling the International Border. The route would then proceed northwesterly, through the hills south of Dulzura and Engineer Springs, cross Jamul Mountains and continue along the southern edge of San Miguel Mountain. The final portion (Link 151) of the preferred route would turn northeasterly, and proceed from Miguel Substation across the northwest face of the San Miguel Mountain, through steep hills, to Los Coches Substation west of Lake Jennings. The preferred route would then proceed west, traversing areas of urban development and steep hills, to Mission Tap.

The California portion of the environmentally preferred route can generally be characterized as having moderate environmental consequences with several significant unavoidable adverse impacts. The route would traverse areas of moderate-to-high natural scenic-quality and be visible from residences. Visual impacts resulting from structures contrast and landform contrast are predicted for a major portion of the route. The preferred route would pass through 79.6 miles of special-status plant habitat and traverse raptor nesting areas and the habitats of the Andrew's scarab beetle, flat-tailed horned lizard, bighorn sheep and magic gecko. Of approximately 22.4 miles of agricultural land crossed, approximately 10.1 acres would be excluded from productive use. The preferred route crosses several areas of park, preservation or recreation land-use; and a total of one single-family dwelling and one mobile home would be highly impacted. The route would also traverse areas of archaeological concern designated by BLM as having "very high" sensitivity and "severe density" of sites. One historical site and numerous cultural-resource sites of Native American concern would be potentially affected.

BLM Preferred Route

BLM's preferred route on public lands is the northern environmentally preferred route. (See Figure 3-15(R).)

Cost Comparison

The comparative costs of alternative routes are shown on Table 3-9(A) in the column entitled "Estimated Costs." The estimated costs (1980 dollars) are for construction only and do not include costs for acquisition of rights-of-way, ancillary facilities, ad valorem taxes, mitigation or allowance for funds used during construction and environmental studies.

Applicants Preferred Route

The Applicants preferred route is the northern environmentally preferred alternative, with two exceptions. Both exceptions are located in the Muggins Mountains/Dome area in Arizona. The first exception substitutes Link 28 for Links 29, 30a and 30b. The second exception substitutes Links 86, 76 and 74b for Links 36, 37 and 40a.

In both instance, the Applicants deviations from the northern environmentally preferred route were selected because the utilities believe they represent a more reasonable balance between the human and natural environments. (See Figure 3-15(R).)

CHAPTER 4 - THE AFFECTED ENVIRONMENT

N.B. This chapter supplements Chapter 4 in the DES.

INTRODUCTION

This chapter provides a description of the environment that would affect or be affected by the construction, operation, maintenance and abandonment of the proposed transmission system. The first part, "Transmission," describes the environment for alternative 500kV transmission-line routes. The second part, "Ancillary Facilities," describes the environment for the substations, microwave facilities, and 161kV and 69kV transmission systems associated with the 500kV transmission line.

In each part, the environment is described through analysis of an inventory of existing conditions and resources within three broad divisions: the natural environment, the human environment and the cultural environment. The natural environment includes climate and air quality, geotechnical features and hazards, and ecological resources. The human environment includes social and economic, agricultural, park, preservation and recreation land-uses; visual and acoustical characteristics; and socioeconomic construction, fiscal and sociocultural analysis. The cultural environment includes archaeological, historical and Native American cultural resources.

Because of the dissimilar natures of the various disciplines used in analysis of the environment, and the varying amounts of data generated, each set of inventory results has been presented in what was deemed the most appropriate form, i.e., either within the discussion, or in tables and/or maps.

Other differences among the resource inventories can be attributed to the relative position of each resource in a hierarchy of significance determined by the relative sensitivity of each resource to potential impacts from the proposed action. Accordingly, ecological, visual and archaeological resources, and land use, including agriculture, have been treated with greater scope and emphasis than other resources.

The inventory results establish the baseline for assessing potential impacts from the proposed action along alternative routes. The ultimate purpose is, however, a comparison of potential impacts throughout the network of alternative routes. Because of the size and complexity of the alternative routing network, the overall routing network was organized into subdivisions called sets and connectors as described in Chapter 3.

Several other definitions are pertinent and are best explained within the context of the inventory process. Once preliminary corridor locations have been identified, centerlines (routes) within each preliminary corridor are determined. A study area is then defined in terms of distance (e.g., one or two miles) on either side of the alternative centerlines. The area thus delineated is

called a study corridor. Resource investigations are conducted within the "study area" or "study corridors." The terms have been used interchangeably in this document.

All of the resource discussions that follow, with the exception of agriculture, are based on supplemental Phase II environmental studies and pertain solely to transmission lines, substation and microwave facilities in the Yuma, Sand Hills, Imperial, Dulzura and Miguel-Mission Tap areas where supplemental studies were conducted subsequent to the Draft Environmental Document (DES). The source document for the 500kV transmission-line environmental studies described in the DES is the APS/SDG&E Interconnection Project Environmental Study, Phase II Corridor Studies, Wirth Associates, Inc., August 1980. The source document for the 500kV transmission-line environmental studies described in this Supplement to the DES (SDES) is the APS/SDG&E Interconnection Project Environmental Study, Phase II Corridor Studies - Addendum, Wirth Associates, Inc., April 1981, referred to in Chapters 4 and 5 as Phase II Corridor Studies - Addendum. The source document for the ancillary-facility environmental studies is the APS/SDG&E Interconnection Project Environmental Study Ancillary Facility Studies - Addendum, Wirth Associates, Inc., April 1981.

Reference should be made to Table 3-8c and Figure 3-14(R) in Chapter 3 when reviewing the discussion and results of resource inventories. Other tables and figures referred to in the text of Chapter 4 can be found at the end of the chapter. It is important to note that inventory tables for the 69kV and 161kV transmission routes are presented by resource following the tables for the 500kV transmission-line routes.

TRANSMISSION

THE NATURAL ENVIRONMENT

Climate and Air Resources

Climate and air resources associated with the alternative routes were investigated between December 1980 and January 1981. The study methods used in the inventory and impact assessment are the same as those described in the DES.

Climate

Table 4-1 in the DES identifies regional compliance with Federal air standards according to the United States Environmental Protection Agency (USEPA) designations. The description provided in the DES also describes the climate associated with the new alternatives evaluated.

Air Quality

As previously discussed in the DES (p. 4-4), the transmission-line route would cross or be adjacent to the Fort Yuma Indian Reservation. This area has been designated as a Class II air-quality area in terms of USEPA prevention of significant deterioration standards. The tribal authorities are permitted by law to petition for redesignation to Class I. Links crossing the Fort Yuma Indian Reservation include 101, 124a and 165.

Geotechnical Features

Geotechnical features were inventoried between April 1980 and January 1981 for two-mile-wide alternative corridors. The study methods used for inventory and impact assessment activities remained the same as described in the DES (p. 4-5). Inventory results appear in Chapter 2 of the Phase II Corridor Studies - Addendum.

Geotechnical features and hazards were inventoried according to four major classifications: geology, paleontology, soils and hydrology.

Results

Results not described below can be found in Figure 4-1(A) and Table 4-2(A).

Geology

Active subsidence potential - a function of tectonic activity, groundwater, or geothermal production - is anticipated along many alternate corridors (Table 4-2(A)). A high-to-moderate potential for liquefaction can be expected along Set IX(R) - Links 129, 130, 132a, 132b, 135 and 136; and Connector I(R) - Link 128c. High-to-moderate potential for slope instability is expected along Set IX(R) - Links 129, 130 and 136; Connector I(R) - Link 128c; Set XIV - Link 110a; and Set XV - Link 126A. A high-to-moderate potential for seismic settlement was identified along Set IX(R) - Links 116, 129, 130, 132a, 132b, 133, 135, 136 and 138; Set XIV - Links 125, 134 and 164; Set XV; and Connector I(R). Faults were identified along Set XIV - Link 124b and Connector I(R) - Link 128b. Unique features were present on Set XIV - Links 125, 134 and 164; Set XV; and Connector I(R). Gem and mineral locales were located along Set XIII - Link 28.

Soil types and erosion potential are shown on Table 4-2(A). Soils with a high-to-moderate expansive potential occur along Set IX(R) - Links 129, 132a, 132b and 136. Sand dune deposits were identified along Set XIV - Links 38, 43, 51, 56, 59, 60, 62, 63, 78, 81, 82, 124b, 125, 134, 160, 161, 163 and 164; and Set XV - Links 126 and 126A.

Ecological Resources

Ecological resources within the alternative corridors for the proposed transmission lines were studied from April 1980 to January 1981. The study methods used for the inventory and impact assessment were identical to the methods described in the DES (pp. 4-8 and 4-9). Inventory results appear in Chapter 3 of the Phase II Corridor Studies - Addendum.

Results

A summary of the SDES study results can be found in Tables 4-3(A) and 4-4(A) and Figures 4-2(A) and 4-3(A).

THE HUMAN ENVIRONMENT

Land Use

All existing, planned and officially designated land-uses within alternative corridors were inventoried between May 1980 and January 1981. Inventory results appear in Chapter 7 of the Phase II Corridor Studies - Addendum report. The purpose of the inventory was to identify, map and describe jurisdictions, social and economic land uses, and park, preservation and recreation land-uses.

Methods and categories used in the land-use study were the same as previously described for land use in the DES (p. 4-22). Land-use data for the Dulzura and Yuma areas were updated.

Jurisdictions - Arizona

Arizona land jurisdictions along the SDES corridors fall within eight classifications: public lands, military reservations, Indian reservations, state trust land, state parks/game and fish land, irrigation districts, and county and other lands. A general description of the location of these jurisdictions except state park/game and fish land can be found in the DES. Arizona State Game and Fish lands were identified as the Mittry Lake Wildlife Refuge along the Colorado River north of Laguna Dam. Arizona State Park lands included the Yuma Territorial State Park located in northeast Yuma.

Social and Economic Land Uses - Arizona

Social and economic land uses were inventoried according to the following classifications: residential, public and quasi-public, commercial and industrial, agriculture, air facilities, restricted military, roads and highways, utilities and future plans.

Residential, public and quasi-public land uses within the Arizona SDES corridors are principally associated with the Yuma Proving Ground and the Colorado River area.

The Yuma Proving Ground Test Station Airport with recognized airspace is located approximately two miles east of Mittry Lake. Two canals, the Gila Main and the North Gila Drain, are located within the SDES study corridors. The Gila Main originates at the Imperial Dam and flows south paralleling the western boundary of the Yuma Proving Ground. The North Gila Drain runs south from Laguna Dam along the western foothills of the Laguna Mountains.

Park, Preservation and Recreation Land Uses - Arizona

BLM Wilderness Study Areas (WSA) - In 1976 the Federal Land Policy and Management Act (FLPMA) directed that lands under Bureau of Land Management (BLM) jurisdiction be inventoried and evaluated with respect to wilderness potential for possible inclusion in the National Wilderness Preservation System. The initial wilderness inventory of public lands in Arizona was completed in September 1979. The BLM has since conducted an intensive inventory, which involved field verification of wilderness characteristics of the remaining lands. In the intensive inventory, which was completed in November 1980, it was found that Intensive Wilderness Inventory Unit (IWIU) 5-37 does not have wilderness characteristics that would qualify it for designation as a WSA.

Arizona State Game and Fish Wildlife Areas - The Mittry Lake Wildlife Area is located north of Laguna Dam and borders the Yuma Proving Ground.

BLM Management Framework Plan (MFP) - One of the Yuma MFP multiple-use recommendations is to establish off-road vehicle (ORV) closed and open areas located between the Yuma Proving Ground and the Colorado River north of Imperial Dam.

Colorado River Recreation Sites - The Laguna-Martinez Recreation Lands lie along the Colorado River within the study area in California and Arizona.

Campgrounds - Only the Imperial Oasis Concession Area provides campsites within the SDES study corridors.

Water-Oriented Use Areas - The Colorado River, e.g., the Imperial Reservoir, in Arizona and California is by far the most significant water-based recreational resource within any of the study corridors.

Day-Use Areas - Three proposed day-use areas are found within the SDES corridor and are identified as Imperial Dam, Imperial Oasis (not restricted to day use) and Laguna Park.

Boat Ramp - Boat ramps exist at Mittry Lake and Imperial Oasis, and one is proposed at Laguna Park.

Other - Other informal uses are dispersed and include hiking/backpacking, horseback riding, hunting, rockhounding, sightseeing for historical and natural values, camping, picnicking and recreational vehicle usage.

Jurisdictions - California

Six categories of land jurisdictions were identified along the SDES study corridors: public lands, Indian reservations, irrigation districts, military reservations, state land, and county and other land. A major portion of the SDES corridors contains public lands with scattered state land east of the Sand Hills (normally Sections 16 and 36). Within the East Mesa these sections (16 and 36) fall under the jurisdiction of county and other.

The Quechan Indian Reservation is situated along the Colorado River north of Yuma.

Two military reservations were identified within the SDES corridors: one located south of Highway 78 in East Mesa, and the second within the central portion of East Mesa.

Irrigation districts occur along the Pilot Knob Mesa.

Social and Economic Land Uses - California

Residential, public and quasi-public and commercial land-uses within the California SDES corridors are limited and occur along the Colorado River in the vicinity of Imperial and Laguna dams.

Numerous mining sites and mineral locations occur within the California study corridors, the vast majority of which are abandoned or inactive. Major concentrations of mining and mineral resources within the study corridors include the southern edge of the Chocolate Mountains and the Cargo Muchacho Mountains.

Two 161kV woodpole transmission-lines were identified within the SDES corridors: west of Mittry Lake and west of the Cargo Muchacho Mountains.

Immediately west of Imperial Dam, Colorado River water is diverted into the All-American Canal for irrigation. West of the Sand Hills, water is diverted into a new concrete-lined canal (Coachella Canal) which roughly parallels the old Coachella Canal (now abandoned) to Highway 78.

Park, Preservation and Recreation Land Uses - California

BLM WSA - The BLM has designated WSAs or identified roadless areas with wilderness potential for the California Desert Conservation Area (CDCA) and the California BLM wilderness review, excluding the CDCA. The CDCA was established in 1976 by FLPMA and provided a comprehensive desertwide management plan to Congress by 1980. The short time-frame required that wilderness be evaluated in the Conservation Area in time to have those values considered in the desertwide plan. BLM's Wilderness Program, therefore, began in the California Desert on April 19, 1978 and was completed with publication of the Final Descriptive Narratives on March 31, 1979. Two WSAs were identified within the SDES study corridors. CDCA WSA #356 occupies a portion of the Chocolate Mountains west of Imperial Reservoir; CDCA-WSA #360 occupies the Sand Dunes north of Highway 78.

Areas of Critical Environmental Concern (ACEC) - In the SDES study corridors the six proposed ACECs are: Lake Cahuilla No. 2, Lake Cahuilla No. 3, Lake Cahuilla No. 4, East Mesa, Lake Cahuilla No. 5 and Plank Road.

Potential National Natural Landmark - A potential national natural landmark has been identified as the Tumco Mines in the Cargo Muchacho Mountains.

California State School Land - Seven separate parcels of school land (about 3,840 acres) are situated in the mountains of eastern Imperial County.

Local, County and Regional Parks - The Phil Swing Park managed by IID is located along the Colorado River at Imperial Dam.

BLM ORV Use Area Designations - The BLM's California Desert Vehicle Management Program has identified three ORV areas within the SDES study corridors; one closed area near Senator Wash Dam, one open area west of Imperial Reservoir and one restricted designated roads and trails area in the Picacho Peak region.

Campgrounds - Four existing campgrounds were identified and are located at Phil Swing Park, Squaw Lake, Senator Wash and the BLM Gecko Campground in the Sand Hills near Highway 78. Two proposed campgrounds will be located at South Mesa and Kripple Kreek areas near the Colorado River west of Imperial Reservoir. The Laguna Dam South Campground is located on the Fort Yuma Indian Reservation.

Water-Oriented Use Areas - The Colorado River is by far the most significant water-based recreational resource within the SDES study corridors. In addition, the Senator Wash Reservoir also provides recreational opportunities.

BLM Concentrated Use Zone - Other informal land-based recreation areas on public lands were identified from the BLM's Concentrated Use Zone information compiled for use in the California Desert Plan Process. Three of these concentrated use areas are located in the SDES study corridors. Concentrated Use Zone #546 is located between the Cargo Muchacho and Chocolate mountains; Concentrated Use Zone #547 is located in the Tumco Mine area in the Cargo Muchacho Mountains; and Concentrated Use Zone #528 is located in the Sand Dunes south of Highway 78.

Day-Use Areas - Two existing day-use areas were found at Squaw Lake and Senator Wash. Proposed day-use areas were found along the Colorado River at Trader Horn, Little Hollywood/Horseshoe Lake and Senator Wash North Shore.

Boat Ramps - Boat ramps were identified along the Colorado River at Squaw Lake and Senator Wash.

Other - Informal uses are dispersed and include hiking/backpacking, horseback riding, hunting, rockhounding, sightseeing for historical and natural values, camping, picnicking and recreational vehicle usage. A travel/recreational vehicle park was identified in the Quechan Indian Reservation three miles north of Yuma.

Results

Inventory results can be found in Tables 4-5(A), 4-6(A) and 4-7(A) and Figures 4-4(A) through 4-10(A).

Agricultural Resources

Agricultural resources along proposed rights-of-way within the alternative corridors were inventoried between December 1980 and January 1981. Methods used for the SDES were similar to those used in the DES. See Appendix D of the DES.

Results

Total miles of agricultural land crossed are shown in Table 3-9(R).

Socioeconomic-Construction and Fiscal Analysis

The socioeconomic study of the alternative corridors was conducted from April 1980 to January 1981. Study results appear in Chapter 8 of the Phase II Corridor Studies - Addendum report.

The methods used in the socioeconomic study remained the same as those described in the DES (p. 4-39).

Results

Projected assessed valuations of the SDES alternative routes are shown by route in Table 4-8(A).

Visual Characteristics

The visual study for SDES Alternative Corridors was conducted between May 1980 and January 1981. The inventory procedures were the same as those described in the DES (pp. 4-43 through 4-46). Study results appear in Chapter 9 of the Phase II Corridor Studies - Addendum.

The visual resource study was conducted with BLM's established methods as defined by the 8411 Manual, Upland Visual Resource Inventory and Evaluation. Also used was BLM Manual, Visual Resource Contrast Rating which provided guidelines for assessing the potential visual contrast of the proposed activities.

Results

Inventory results can be found in Table 4-9(A).

Acoustical Characteristics

Environmental noise characteristics of the alternative corridors were inventoried during January 1981. The methods used were the same as those described in the DES (see pp. 4-46 and 47). Results appear in Chapter II in the Phase II Corridor Studies - Addendum.

Results - Arizona and California (500kV)

The alternative transmission corridors are located primarily in remote areas of Yuma County in Arizona, and Imperial and San Diego counties in California. These areas are desert, mountainous or agricultural lands, except for the regions adjacent to the community of Yuma, and several unincorporated communities and settlements, most of which contain residential, commercial and industrial land-uses. Sound levels associated with existing land-uses of the alternative routes are as follows:

A. Agricultural and Unpopulated Land

Typical day-night sound levels for agricultural and unpopulated lands range between 35 and 47 dBA. Alternative routes with existing desert and agricultural land-use sound levels are:

Set IX (R)

Link 116, 135

Set XV

Links 126, 126A, 128a

Set XIV

Links 36, 37, 44, 45, 46, 48
49, 51, 101, 110a, 165, 164,
134, 43, 124a, 124b, 125,
52b, 81, 82, 117b, 163, 164,
40a, 40b, 41

Connector I(R)

Links 128b, 128c

B. Residential Land Use

Typical day-night sound levels for urban and suburban land-use areas range between 48 and 65 dBA. Alternative routes associated with residential land-use sound levels are:

Set IX(R)

Links 129, 130, 132, 133,
136, 138

Set XIII

Links 28, 29, 30a, 30b

Set XI(R)

Links 145a, 145b, 145c,
145d, 146a, 146b, 155,
156, 157, 158, 159

Set XIV

Links 38, 51, 108, 162, 56, 59, 60,
62, 63, 65, 67, 68, 70, 86, 78, 160,
162

C. Commercial and Industrial

Typical day-night sound levels for commercial and industrial land-uses range between 60 and 80 dBA. Alternative routes associated with commercial and industrial land-use sound levels are:

Set IX(R)

Links 132, 138

Set XIII

Link 29

Set XI(R)

Links 145a, 145b, 145c, 145d,
146a, 146b, 155, 157, 159

Set XIV

Links 38, 44, 51, 165, 162, 62, 65,
67, 68, 124a, 124b, 86, 78, 160, 161,
40a, 40b

THE CULTURAL ENVIRONMENT

Note to Reviewers

All sites identified during archaeological surveys will be reviewed by the Arizona and California State Historic Preservation Officers (SHPO) for potential inclusion in the National Register of Historic Places. Determination of eligibility, determination of effect and identification of measures to avoid or mitigate any adverse effects will follow procedures prescribed in 36 CFR 800 and 36 CFR 1204.

Archaeological Resources

Archaeological resources were inventoried from April 1980 through January 1981. Inventory results appear in Chapter 4 of the Phase II Corridor Studies - Addendum report.

The methods used in the archaeological-resources study follow those outlined for archaeology in the DES (p. 4-50).

Results

Inventory results can be found in Table 4-10(A) and Figure 4-13(A).

Historical Resources

Historical resources for the two-mile-wide study corridors were inventoried from April 1980 to January 1981. Inventory results appear in Chapter 5 of the Phase II Corridor Studies - Addendum report.

The methods used in the historical-resources study are the same as those used for the historical-resources study described in the DES (see pp. 4-54, 55).

Results

Inventory results can be found in Table 4-11(A).

Native American Cultural Resources

Native American cultural-resources within the alternative corridors were studied from April 1980 through January 1981. Inventory results appear in Chapter 6 of the Phase II Corridor Studies - Addendum report.

Methods used in conducting the Native American cultural-resources study remained the same as those used for the Native American cultural-resources study described in the DES (see pp. 4-60, 61).

Results

Inventory results can be found in Table 4-12(A).

ANCILLARY FACILITIES

INTRODUCTION

For the SDES, ancillary facilities associated with the 500kV transmission lines are divided into four functional components: substations, 69kV transmission system, 161kV transmission line and microwave communications system (see Figure 3-13(R)).

The substations component consists of three new alternative 500/69kV substations in Yuma County (Gila, North Gila and Dome Valley) in addition to the Yucca Substation site described in the DES. The 69kV transmission system consists of four typical alternative systems (one from each substation site in Yuma County) to interconnect the 500kV system with the Yuma urban area. The 161kV transmission line component consists of two typical alternative corridors (B-2/B-D and D-2/B-D) for a line to interconnect the 500kV system (through the proposed Imperial Valley Substation) and the Imperial Irrigation District (IID) system. The microwave communications-system component consists of two alternative microwave installations (Mission Control Center and San Miguel Mountain) located in southern San Diego County. No environmental studies were required for the Mission Control Center site, as no new development is required.

In general, the method used in inventorying the affected environment in the ancillary facilities study was the same as previously described in the DES (see p. 4-64). Complete inventory results appear in the APS/SDG&E Interconnection Project Environmental Study, Ancillary Facility Studies - Addendum.

Substations - Results

The Natural Environment

Air Resources - The three substation sites are all located in Class II air-quality areas in terms of the USEPA prevention of significant deterioration standards.

Geotechnical Features - There is a high potential for soil erosion at the Gila Site due to granular soils of active dunes.

Ecological Resources - The principal vegetation type for the Gila and North Gila sites is creosotebush-bursage associations. Paloverde-ironwood associations with some mesquite dominate the Dome Valley site. Suitable habitat for one Federally proposed threatened or endangered species, *Triteliopsis palmeri*, occurs on the Gila site.

The Human Environment

Land Use - The Gila and North Gila sites are under the jurisdiction of Arizona State Trust Lands, Yuma County and others. The Dome Valley site is under the jurisdiction of the Yuma Proving Ground, the BLM and Yuma County. One single-family dwelling is located on the Dome Valley Site. An existing substation and planned residential development occur on the Gila site.

Socioeconomic - Tax-rate areas, jurisdictions, tax rates, and assessed values for all substation sites are shown in Table 4-13(A).

Visual Resources - The North Gila site is in a Class II area and the remaining sites are in Class IV areas.

Acoustical Characteristics - Ambient noise-levels at the Gila site are predicted to range between 35 and 65 dBA and between 35 and 47 dBA for the remaining sites.

The Cultural Environment

The probability of encountering archaeological sites at the North Gila site is high. Historic sites were identified at the Gila and North Gila sites.

69kV Transmission Line - Results

The Natural Environment

Air Resources - The alternative corridors are contained in Class II air-quality areas. Links 211 and 212 pass near several Indian reservations, which are permitted by law to petition for redesignation to Class I.

Geotechnical Features - A high potential for soil erosion occurs on Links 205 (0.4 mile), 207 (0.1 mile), 208 (0.5 mile), 209 (14.0 miles), 211 (0.3 mile), and 213 (1.2 miles).

Ecological Resources - Ecological resources within the alternative corridors have been modified by the presence of agriculture and urban areas. Approximately 65 percent of the alternative corridors have been classed as developed. The vegetation within the remainder of the corridors are creosotebush-bursage associations. The flat-tailed horned lizard, listed among the threatened and unique wildlife of Arizona, may occur on those links traversing creosotebush communities on fine sandy soils.

The Human Environment

Land Use - Land use within the alternative corridors, generally under the jurisdiction of the BLM and Yuma county, is oriented towards agriculture. Existing land-uses within the alignment associated with the Yucca Substation site (Links 212 and 213) include: two single dwellings, an equestrian area and a livestock feedlot. Land uses associated with the North Gila site alternative (Links 204, 205, 206, 207, 209, 210, 211 and 213) include: 34 single dwellings, four mobile-home parks, five light industries, one church and several commercial and industrial areas. Land uses associated with the Dome Valley site alternative (Links 201, 202, 203, 205, 207, 209, 211 and 213) include: 37 single dwellings, four mobile-home parks, six light industries, three livestock feedlots, one church, and several commercial and industrial areas. Link 201 crosses the N.R. Adair County Park for 1.5 miles. Link 213 crosses a municipal golf course (0.6 mile), an athletic field (0.3 mile) and Arroyo Golf Course (0.3 mile).

Socioeconomic - Tax-rate areas, tax rates and assessed values for alternative corridors are shown in Table 4-13(A).

Visual Resources - Several of the alternative corridors are located in developed areas considered Tentative Management Class III areas mainly because of their visual sensitivity. The 69kV lines associated with the Yucca site cross 8.4 miles of Management Class II and 1.6 miles of Management Class III. The alternative corridors associated with the Gila site cross 6.8 miles of Management Class II, 3.4 miles of Management Class III and 5.5 miles of Management Class IV. Alternative corridors associated with the North Gila site cross 25.7 miles of Management Class II, 5.1 miles of Management Class III and 5.7 miles of Management Class IV. Alternative corridors associated with the Dome Valley site cross 39.8 miles of Management Class II, 7.9 miles of Management Class III and 7.9 miles of Management Class IV.

Acoustical Characteristics - Ambient noise-levels along the alternative routes range between 35 and 47 dBA in agricultural areas and between 60 and 80 dBA in commercial and industrial areas.

The Cultural Environment

Archaeological Resources - The probability of encountering prehistoric archaeological resources along the corridors is generally low because of current agricultural practices in Gila Valley, except that wherever the corridors emerge from agricultural lands, the probability level increases to moderate or high. Links exhibiting areas of high probability include: 201 (7.0 miles), 202 (1.9 miles), 203 (2.2 miles), 204 (0.8 mile), 206 (0.6 mile), 210 (0.5 mile), 211 (0.5 mile).

Historic Resources - Links 201, 202 and 203 would pass near identified historic sites with official status. One site, San Ysidro Ruins, is on the National Register for Historic Places.

Native American Cultural Resources - The southeastern corner of a village site (837e) associated with rock art (950i) is crossed by Link 203. Also, Link 201 passes within one-half mile of a mountain peak sacred to the Quechan (717a).

On the Arizona side of the Colorado River a Quechan/Cocopah cemetery (705a) and a Cocopah mobile-home development on homestead land (806e) are within one-quarter mile and three-quarters of a mile, respectively, of Link 212.

161kV Transmission Line - Results

The Natural Environment

Air Resources - The alternative corridors are located in a nonattainment area for ozone that has been designated unclassified for particulate matter.

Geotechnical Features - The corridors have a high-to-moderate potential for seismic settlement due to their proximity to active faults such as the Superstition Hills and Superstition Mountain faults. The entire lengths of Corridor D-2, B-D, as well as 18.7 miles of Corridor B-2, B-D are characterized by a high-to-moderate liquefaction potential. The remaining 5.5 miles of Corridor B-2, B-D has a low-to-nonexistent liquefaction potential. High-to-moderate slope instability occurs along 2.8 miles of Corridor B-2, B-D and 2.8 miles of Corridor D-2, B-D. Both corridors exhibit an active/potential subsidence. Corridor D-2, B-D, as well as 22.8 miles of Corridor B-2, B-D, have a low-to-nonexistent erosion potential. The remaining 1.4 miles of Corridor B-2, B-D has a moderate-to-low erosion potential. A low-to-nonexistent potential for expansive soils occur along 11.4 miles of Corridor B-2, B-D as well as 4.7 miles of Corridor D-2, B-D. A high-to-moderate potential for expansion soils occurs along the remaining 12.8 miles of Corridor B-2, B-D and D-2, B-D. Corridor B-2, B-D is susceptible to inundation along 2.5 miles with a moderate-to-low flooding potential for 5.5 miles. Corridor D-2, B-D is susceptible to inundation for 0.3 mile with the remaining portion exhibiting a low-to-nonexistent potential for flooding.

Ecological Resources- Ecological resources within the alternative corridors have been disturbed by the presence of agriculture. Desert riparian habitat is considered potential habitat for the Federal- and state-listed Yuma clapper rail and occurs along 1.9 miles of Corridor B-2, B-D and 0.1 mile of Corridor D-2, B-D. A moderate quality creosotebush vegetation (habitat for

flat-tailed horned lizard) is identified along 3.0 miles of Corridor B-2, B-D as well as 0.3 mile of Corridor D-2, B-D. A potential waterfowl-collision hazard due to a waterfowl rookery along the New River exists along 2.3 miles of Corridor B-2, B-D and 1.5 miles of Corridor D-2, B-D.

The Human Environment

Land Use - Of Corridor B-2, B-D, 20.6 miles fall under the jurisdiction of Imperial County, as well as 17.2 miles of Corridor D-2, B-D. The remaining portions of the corridors are public lands. Along Corridor B-2, B-D, the following land uses were identified: 31 single dwellings, one commercial, one strip commercial, one extractive, Imperial County Airport Approach Zone, BLM Concentrated Use Zone #514, Plaster City ORV Open Area and the Superstition Hills ORV Restricted Designated Roads and Trails Area.

Along Corridor D-2, B-D the following land uses were identified: 15 single dwellings, one strip commercial, Imperial County Airport Approach Zone, proposed BLM-ACEC, BLM Concentrated Use Zone #522 and the Yuha Basin ORV Restricted Designated Roads and Trails Area.

Socioeconomic - Tax-rate areas, tax rates and assessed values for Corridors B-2, B-D and D-2, B-D are shown in Table 4-13(A).

Visual Resources - The alternative corridors generally cross agricultural land considered Scenic Quality B and are within the foreground/middleground distance zones and areas of high sensitivity. Corridor B-2, B-D crosses Tentative Management Class III Area for 7.6 miles with the remaining 16.6 miles identified as a Tentative Management Class II Area. Corridor D-2, B-D crosses 16.6 miles of a Tentative Management Class II Area with the remaining 0.9 mile a Tentative Management Class III Area.

Acoustical Characteristics - Ambient noise-levels along the corridors range between 35 and 80 dBA.

The Cultural Environment

Archaeological Resources - The probability of encountering prehistoric archaeological resources along the two corridors is generally low because of existing agriculture. Corridor B-2, B-D has 4.5 miles of high probability and 2.6 miles of moderate probability while Corridor D-2, B-D has 0.8 mile of high probability and 0.2 mile of moderate probability.

Historic Resources - The following historic sites were identified along Corridor B-2, B-D: Mormon Battalion (Cookes) Route, Southern Emigrant/Butterfield Overland Mail Company Route, San Diego to Fort Yuma Road, San Diego and Arizona Eastern Railway, Dixieland, Dixieland School, Seely, Blue Lake/Silsbee Cattle feeding place, Silsbee School/John W. Kramer residence, Anza Expedition Route, Southern Pacific Railroad/Niland Calexico Branch and Kearney Route of 1846. The following sites were identified along Corridor D-2, B-D: Southern Emigrant/Butterfield Overland Mail Company Route, El Centro Station, Blue Lake/Silsbee Cattle feeding place, Silsbee School/John W. Kramer residence, Anza Expedition Route, Southern Pacific Railroad/Niland Calexico Branch and the Kearny Route of 1846.

Native American Cultural Resources - All of the corridors cross, parallel or enter the New River area used by the Kamia (Desert Kumeyaay) for habitation, farming, fishing, gathering and hunting. Corridor B-2, B-D, as well as D-2, B-D, has an identified multiple-resource area, planting, fishing and gathering areas, water sources, trails, villages, village area and trade areas.

Microwave Communication System - Results

The Natural Environment

Air Resources - The San Miguel Mountain site is in a Class II air-quality area and is in a nonattainment area for ozone, carbon monoxide, nitrogen dioxide and particulates.

Geotechnical Features - A moderate-to-low potential exists for slope instability and soil erosion.

Ecological Resources - The predominant vegetation for the San Miguel Mountain site is chaparral and is a known nesting and breeding area for raptors. Four California special-status plants are expected to occur on-site.

The Human Environment

Land Use - An existing communication facility is presently located on-site. The site is under the jurisdiction of San Diego County.

Socioeconomic - Tax-rate areas, tax rates and assessed value for the microwave site are shown on Table 4-13(A).

Visual Resources - The San Miguel Mountain site was identified as a Tentative Management Class IV.

Acoustical Characteristics - Ambient noise-levels range between 48 and 65 dBA.

The Cultural Environment

The probability of encountering prehistoric sites is low and no recorded historic sites occur. One Native American site (sacred mountain) was identified.

TABLE 4-2 (A)
GEOTECHNICAL FEATURES
TOTAL MILES/ROUTE

LEGEND

Soils

- A = Fine and Granular Soils of Channels and Floodplains
- B = Granular Soils of Alluvial Fans and Valley Plains
- C = Granular Soils of Areas of Active Sand Dunes
- D = Granular Soils of Alluvial Fans
- E = Granular Soils On Rocks
- F = Fine and Granular Soils of Old Alluvial Fans
- G = Fine and Granular Soils on Uplands in Foothills and Coastal Plain Areas

Erosion Potential

- H = High Potential
- M = Moderate Potential
- L = Low Potential
- N = None

Route ID	Subsidence	Soils / Erosion Potential							Flooding	
	Active / Potential	A (L-N)	B (M-L)	C (H)	D (M-L)	E (M-L)	F (M-L)	G (M-L)	Inundation	Severe/Mod
SET IX(R)-RTE 1	27.6	31.0	1.2	0.0	0.0	0.5	8.2	0.0	7.8	3.1
SET IX(R)-RTE 2	40.5	36.3	15.5	0.0	0.0	0.0	7.0	0.0	1.7	3.1
SET IX(R)-RTE 3	48.9	41.2	27.8	0.0	0.0	0.0	7.8	0.0	1.7	27.5
SET XI(R)-RTE 1	4.9	0.0	2.0	0.0	0.0	0.9	0.0	8.8	0.3	0.0
SET XI(R)-RTE 2	0.0	0.0	0.6	0.0	0.0	5.1	0.0	9.1	0.0	0.0
SET XI(R)-RTE 3	0.0	0.0	0.0	0.0	0.0	3.3	0.0	9.1	0.7	0.0
SET XI(R)-RTE 4	0.6	0.0	0.0	0.0	0.0	3.3	0.0	9.3	0.7	0.0
SET XI(R)-RTE 5	3.2	0.0	1.1	0.0	0.0	3.0	0.0	8.9	0.5	0.0
SET XIII-RTE 1	0.0	1.4	0.0	0.0	0.0	2.8	8.9	0.0	0.0	0.0
SET XIII-RTE 2	0.0	12.9	0.0	0.0	0.0	0.0	2.8	0.0	3.4	0.0
SET XIV-RTE 1	11.5	13.3	8.5	2.3	2.6	9.4	9.2	0.0	2.1	0.7
SET XIV-RTE 2	0.0	18.7	0.2	16.2	2.6	4.8	1.9	0.0	1.4	0.2
SET XIV-RTE 3	0.0	18.7	0.2	16.2	2.6	4.8	1.9	0.0	1.4	0.2
SET XIV-RTE 4	7.7	8.2	8.9	0.0	0.0	12.5	16.3	0.0	1.8	0.5
SET XIV-RTE 5	11.5	5.0	8.5	0.0	0.0	7.7	15.5	0.0	0.6	0.5
SET XIV-RTE 6	11.5	10.9	8.5	0.0	0.8	9.4	9.2	0.0	2.0	0.5
SET XV-RTE 1	5.8	0.9	0.0	4.9	0.0	0.0	0.0	0.0	0.0	0.0
SET XV-RTE 2	0.0	0.0	0.0	4.9	0.0	0.0	0.2	0.0	0.0	0.0
CONNECTOR 1(R)	19.3	0.6	0.0	0.2	0.0	0.0	19.9	0.0	16.5	0.0

Source: Wirth Associates, Inc., Apr 1981

TABLE 4-2(A) GEOTECHNICAL FEATURES (Continued)

Route ID	Subsidence	Soils / Erosion Potential							Flooding	
	Active / Potential	A (L-N)	B (M-L)	C (H)	D (M-L)	E (M-L)	F (M-L)	G (M-L)	Inundation	Severe/Mod
ANCILLARY FACILITIES: 69kV TRANSMISSION LINE										
69 kV-RTE 1	0.0	8.8	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0
69 kV-RTE 2	0.0	0.0	0.0	15.7	0.0	0.0	0.0	0.0	0.0	0.0
69 kV-RTE 3	0.0	20.5	0.0	16.0	0.0	0.0	0.0	0.0	0.0	0.0
69 kV-RTE 4	0.0	33.9	0.0	16.0	0.8	1.1	3.8	0.0	0.0	0.0
ANCILLARY FACILITIES: 161kV TRANSMISSION LINE										
161 kV-RTE 1	17.5	17.5	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
161 kV-RTE 2	24.2	22.8	0.7	0.0	0.0	0.0	0.7	0.0	2.5	0.0

Wirth Associates, Inc., Apr 1981

TABLE 4-3 (A)
ECOLOGICAL RESOURCES
HABITAT QUALITY AND VEGETATION
TOTAL MILES/ROUTE

CB = Creosote Bush-Bursage SS = Saltbush Scrub
DW = Desert Wash MD = Mesquite Dune
AG = Agricultural/Urban DSS = Desert Stem Succulent
RW = Riparian Woodlands TSS = Transmontane Scrub & Succulent
DR = Desert Riparian CH = Chaparral
PV-I = Paloverde-Ironwood OW = Oak Woodland
PV-C = Paloverde-Cactus CSS = Coastal Sage Scrub
SD = Sand Dune

Route ID	HABITAT			VEGETATION TYPE													
	Quality	Miles	CB	DW	AG	RW	DR	PV-I	PV-C	SD	SS	MD	DSS	TSS	CH	OW	CSS
SET IX(R)-RTE 1	Good	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mod	12.9	10.6	1.3	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	M-L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Low	24.0	0.0	0.0	24.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	40.9	14.6	1.3	24.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SET IX(R)-RTE 2	Good	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mod	35.8	19.7	1.3	0.0	0.0	14.3	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
	M-L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Low	34.7	0.0	0.0	34.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	70.5	19.7	1.3	34.7	0.0	14.3	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
SET IX(R)-RTE 3	Good	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mod	42.3	27.5	0.0	0.0	0.0	14.3	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0
	M-L	18.0	12.5	4.7	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0
	Low	26.4	4.3	1.0	21.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	86.7	44.3	5.7	21.1	0.0	14.3	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0
SET XI(R)-RTE 1	Good	7.8	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.5	1.1	0.0
	Mod	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.9
	M-L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	11.7	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.5	1.1	3.9
SET XI(R)-RTE 2	Good	8.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.3	0.0	2.6
	Mod	5.9	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	4.7
	M-L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	14.8	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.3	0.3	7.3
SET XI(R)-RTE 3	Good	8.2	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	1.5	2.5
	Mod	4.2	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4
	M-L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	12.4	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	1.5	5.9
SET XI(R)-RTE 4	Good	8.4	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.1	1.5	2.5
	Mod	4.2	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4
	M-L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	12.6	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.1	1.5	5.9
SET XI(R)-RTE 5	Good	8.9	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.5	0.7	2.5
	Mod	4.1	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3
	M-L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	13.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.5	0.7	5.8
SET XIII-RTE 1	Good	12.9	10.6	0.0	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mod	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	M-L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	13.1	10.8	0.0	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TABLE 4-3(A) ECOLOGICAL RESOURCES (Continued)

Route ID	HABITAT						VEGETATION TYPE										
	Quality	Miles	CB	DW	AG	RW	DR	PV-I	PV-C	SD	SS	MD	DSS	TSS	CH	OW	CSS
SET XIII-RTE 2	Good	3.9	0.0	0.3	0.0	0.0	0.0	3.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mod	6.6	0.4	0.0	0.0	0.0	0.0	6.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	M-L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Low	5.2	0.0	0.0	0.0	0.0	0.0	5.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	15.7	0.4	0.3	0.0	0.0	0.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SET XIV-RTE 1	Good	10.5	7.7	1.0	0.0	0.0	0.4	0.2	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mod	13.0	9.7	0.4	0.0	0.1	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	M-L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Low	23.7	16.1	0.0	7.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	47.2	33.5	1.4	7.6	0.1	3.2	0.2	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SET XIV-RTE 2	Good	7.1	2.8	0.0	0.0	0.2	0.2	0.2	0.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mod	11.2	10.4	0.2	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	M-L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Low	29.1	4.6	0.0	24.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	47.4	17.8	0.2	24.5	0.2	0.8	0.2	0.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SET XIV-RTE 3	Good	7.1	2.8	0.0	0.0	0.2	0.2	0.2	0.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mod	11.2	10.4	0.2	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	M-L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Low	29.1	4.6	0.0	24.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	47.4	17.8	0.2	24.5	0.2	0.8	0.2	0.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SET XIV-RTE 4	Good	13.9	6.3	2.7	0.0	0.4	0.8	0.0	0.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mod	10.7	5.6	3.1	0.0	0.1	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	M-L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Low	23.2	22.5	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	47.8	34.4	5.8	0.7	0.5	2.7	0.0	0.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SET XIV-RTE 5	Good	10.6	6.3	2.7	0.0	0.0	0.4	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mod	10.7	5.6	3.1	0.0	0.1	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	M-L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Low	17.3	16.6	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	38.6	28.5	5.8	0.7	0.1	2.3	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SET XIV-RTE 6	Good	10.9	8.1	1.0	0.0	0.0	0.4	0.2	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mod	8.7	5.5	0.2	0.0	0.1	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	M-L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Low	21.1	17.4	0.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	40.7	31.0	1.2	3.7	0.1	3.3	0.2	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SET XV-RTE 1	Good	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mod	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	M-L	5.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	5.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	5.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SET XV-RTE 2	Good	5.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0	4.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mod	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	M-L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	5.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0	4.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CONNECTOR 1(R)	Good	17.0	17.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mod	0.8	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	M-L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Low	2.9	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0
	Total	20.7	17.0	0.0	0.8	0.0	0.8	0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0
ANCILLARY FACILITIES: 69kV TRANSMISSION LINE																	
69 kV-RTE 1	Good	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mod	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	M-L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Low	9.5	0.0	0.0	9.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	10.0	0.5	0.0	9.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TABLE 4-3(A) ECOLOGICAL RESOURCES (Continued)

Route ID	HABITAT						VEGETATION TYPE										
	Quality	Miles	CB	DW	AG	RW	DR	PV-I	PV-C	SD	SS	MD	DSS	TSS	CH	OW	CSS
69 kV-RTE 2	Good	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mod	7.5	7.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	M-L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Low	8.2	0.0	0.0	8.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	15.7	7.5	0.0	8.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
69 kV-RTE 3	Good	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mod	9.8	8.9	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	M-L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Low	26.7	1.9	0.0	24.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	36.5	10.8	0.0	24.8	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
69 kV-RTE 4	Good	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mod	11.5	9.9	1.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	M-L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Low	44.0	9.9	0.0	33.3	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	55.5	19.8	1.0	33.3	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ANCILLARY FACILITIES: 161kV TRANSMISSION LINE																	
161 kV-RTE 1	Good	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mod	0.4	0.3	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	M-L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Low	17.1	0.0	0.0	17.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	17.5	0.3	0.0	17.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
161 kV-RTE 2	Good	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mod	4.9	3.0	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	M-L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Low	19.3	2.7	0.0	16.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	24.2	5.7	0.0	16.6	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: Wirth Associates, Inc., Apr 1981

TABLE 4-4(A)
ECOLOGICAL RESOURCES
SPECIAL STATUS

Table Identifiers	Scientific Name	Common Name	Status
VEGETATION			
01	<u>Acanthomintha ilicifolia</u>	San Diego thornmint	NP
02	<u>Astragalus deanei</u>	Dean's locoweed	NP
03	<u>Calochortus dunnii</u>	Dunn's mariposa	CR,NP
04	<u>Eriochloa aristata</u>	Awned eriochloa	NP
05	<u>Linanthus bellus</u>	Desert beauty	NP
06	<u>Ammobroma sonora</u>	Sand Food	NP,FCR
07	<u>Arctostaphylos otayensis</u>	Otay manzanita	NP
08	<u>Astragalus lentiginosus</u> var. <u>borreganus</u>	Borrego locoweed	NP
09	<u>Astragalus magdalenae</u> var. <u>peirsonii</u>	Peirson's locoweed	CE,NP
10	<u>Berberis higginsae</u>	Higgin's barberry	NP
11	<u>Brodiaea orcuttii</u>	Orcutt's brodiaea	NP
12	<u>Calamagrostis densa</u>	Dense reed-grass	NP
13	<u>Castela emoryi</u>	Crucifixion thorn	NP
14	<u>Caulanthus stenocarpus</u>	Slender-pod caulantus	CR,NP
15	<u>Croton wigginsii</u>	Wiggin's croton	CE,NP
17	<u>Ditaxis adenophora</u>	Glandular ditaxis	NP
18	<u>Ditaxis californica</u>	California ditaxis	NP
19	<u>Dudleya variegata</u>	Variegated dudleye	NP
21	<u>Eryngium aristulatum</u> var. <u>parishii</u>	San Diego coyote thistle	CE,NP
22	<u>Ferocactus viridescens</u>	San Diego barrel cactus	NP,FCR
23	<u>Hemizonia floribunda</u>	Tecate tarweed	NP,FCR
24	<u>Helianthus niveus</u> ssp. <u>tephrodes</u>	Desert sunflower	CE,NP,FCR
25	<u>Koeberlinia spinosa</u>	Crown-of-thorns	NP
26	<u>Machaeranthera orcuttii</u>	Orcutt's aster	NP
27	<u>Mentzelia hirsutissima</u> var. <u>stenophylla</u>	Hairy stickleaf	NP
28	<u>Monardella hypoleuca</u> ssp. <u>lanata</u>	Felt-leaf monardella	NP
29	<u>Monardella linioides</u> ssp. <u>viminea</u>	None	CE,NP

TABLE 4-4(A) (continued)
Ecological Resources

Table Identifiers	Scientific Name	Common Name	Status
30	<u>Muilla clevelandii</u>	San Diego golden	NP
31	<u>Navarretia fossalis</u>	None	NP
32	<u>Nolina interrata</u>	San Diego nolina	CE,NP
33	<u>Ophioglossum californicum</u>	California adder's- tongue fern	NP
34	<u>Opuntia wigginsii</u>	Wiggin's cholla	NP
35	<u>Palafoxia linearis</u> var. <u>gigantea</u>	Giant Spanish needle	NP
36	<u>Pholisma arenarium</u>	Pholisma	NP
37	<u>Pilostyles thurberi</u>	Thurber's pilostyles	NP
38	<u>Ribes cantharisorme</u>	Moneno currant	NP
39	<u>Satureja chandleri</u>	San Miguel satureja	NP
40	<u>Senecio ganderi</u>	Gander butterweed	NP
41	<u>Solanum tenulobatum</u>	Narrow-leaved night- shade	NP
43	<u>Adolphia californica</u>	None	NP
44	<u>Artemisia palmeri</u>	None	NP
45	<u>Bursera microphylla</u>	Elephant's foot tree	NP
46	<u>Ceanothus cyaneus</u>	San Diego lilac	NP
47	<u>Chamaebatia australis</u>	Mountain misery	NP
48	<u>Delphinium parishii</u> var. <u>subglobosum</u>	Larkspur	NP
50	<u>Eucnide ruprestis</u>	None	NP
51	<u>Fremontodendron mexicanum</u>	Fremontia	NP
53	<u>Geraea viscida</u>	None	NP
54	<u>Haplopappus junceus</u>	None	NP
56	<u>Ipomopsis tenuifolia</u>	None	NP
57	<u>Lathyrus splendens</u>	Pride of California	NP
58	<u>Lepechinia ganderi</u>	Gander pitcher sage	NP
59	<u>Malperia tenuis</u>	None	NP
60	<u>Salvia munzii</u>	Munz sage	NP
61	<u>Selaginella cinerascens</u>	None	NP
62	<u>Stipa diegoensis</u>	None	NP
63	<u>Tetracoccus dioicus</u>	None	NP
64	<u>Viguiera laciniata</u>	San Diego sunflower	NP
72	<u>Dudleya abramsii</u>	None	NP
75	<u>Lupinus excubitus</u> var. <u>medius</u>	None	NP
76	<u>Myosurus minimus</u> var. <u>apus</u>	Mousetail	NP

TABLE 4-4(A) (continued)
Ecological Resources

Table Identifiers	Common Name	Status**	
		State	Federal
<u>WILDLIFE</u>			
<u>MAMMALS</u>			
101	Ringtail cat	P	
102	Feral burro		P
103	Mountain lion	P****	
104	Peninsular bighorn sheep	R, P	
105	Nelson's bighorn sheep	P	
106	Desert kit fox	P	
<u>BIRDS</u>			
107	Golden eagle	P	P
108	California yellow-billed cuckoo	R	
109	White-tailed kite	P	P
110	Prairie falcon	P	P
111	American peregrine falcon	P, E	E
112	Bald eagle	P, E	E
113	California black rail	R, P	
114	Elf owl		PS
115	Osprey		PS
116	Summer tanager		PS
117	California brown pelican	E, P	E
118	Vermillion flycatcher		PS
119	Yuma clapper rail	R, P	E
120	Spotted owl		PS
121	Bell's least vireo		PS,FCR
<u>AMPHIBIANS</u>			
122	Southwestern toad	P	
123	California red-legged frog	P	
124	San Sebastian marsh leopard frog		PS
<u>REPTILES</u>			
125	Magic gecko		PS
126	Desert tortoise	P	SS
127	Flat-tailed horned lizard	P	PS

TABLE 4-4(A) (continued)
Ecological Resources

Table Identifiers	Common Name	Status**	
		State	Federal
	<u>INVERTEBRATES</u>		
128	Andrew's dune scarab beetle		T, PS
	<u>FISH</u>		
129	Desert pupfish		PS

STATUS

CE - CALIFORNIA ENDANGERED (California Native Plant Society, 1980)

CR - CALIFORNIA RARE (California Native Plant Society, 1980)

NP - California Native Plant Society Inventory

(California Native Plant Society, 1980)

FCP - Species that are currently being reviewed by USFWS for inclusion as
Federally listed threatened or endangered species

(J. Bartel, per. com., July 1980.)

**State of California designations (E=Endangered; R=Rare; P=Protected).

Federal designations: USFWS (E=Endangered; T=Threatened; P=Protected).

BLM (SS=Sensitive Species; PS=Proposed Sensitive Species).

****Protected by moratorium, California Department of Fish and Game, Section 3005.7,
1979.

TABLE 4-4(A) (continued)
Ecological Resources

Route ID	VEGETATION										WILDLIFE				
	Identifiers										Identifiers				
Set IX(R), Route 1	06	08	09	13	15	18	24	25	26		101	102	103	104	105
	27	33	34	35	36	37	41	44	47		106	107	110	111	112
	58	75									114	126	127		
Set IX(R), Route 2	06	08	09	13	15	18	24	25	26		101	102	103	104	105
	27	33	34	36	37	41	44	47	57		106	107	110	111	112
	75										114	126	127		
Set IX(R), Route 3	06	08	09	13	15	18	24	25	26		101	102	103	104	105
	27	33	34	36	37	41	44	47	58		106	107	110	111	112
	75										114	126	127		
Set XI(R), Route 1	01	02	04	06	08	09	13	15	16		101	102	103	104	105
	18	19	20	22	24	25	26	27	29		106	107	108	109	110
	30	33	34	36	37	41	43	44	47		111	112	113	114	115
	49	51	53	54	58	59	60	62	63		116	118	119	121	122
	64	67	70	74	75	77	78				123	126	127		
Set XI(R), Route 2	01	02	03	04	05	07	10	11	12		103	107	108	109	110
	14	17	19	22	23	28	29	30	32		111	112	113	115	116
	38	39	40	41	42	43	45	46	47		118	119	121	122	123
	48	50	52	53	54	55	56	57	60						
	61	62	63	66	68	69	70	71	72						
	73	77	79												
Set XI(R), Route 3	01	02	03	04	05	07	10	11	12		103	107	108	109	110
	14	19	22	23	28	29	30	32	38		111	112	113	115	116
	39	40	41	43	46	47	48	51	53		118	119	121	122	123
	54	56	57	58	60	61	62	63	64						
	72	44													
Set XI(R), Route 4	01	02	03	04	05	07	10	11	12		103	107	108	109	110
	14	19	22	23	28	29	30	32	38		111	112	113	115	116
	39	40	41	43	46	47	48	51	53		118	119	121	122	123
	54	56	57	58	60	61	62	63	64						
	72	44													

TABLE 4-4(A) (continued)
Ecological Resources

Route ID	VEGETATION										WILDLIFE				
	Identifiers										Identifiers				
Set XI(R), Route 5	01	02	03	04	05	07	10	11	12		103	107	108	109	110
	14	19	22	23	28	29	30	32	38		111	112	113	115	116
	39	40	41	43	46	47	48	51	53		118	119	121	122	123
	54	56	57	58	60	61	62	63	64						
	72	44													
Set XIV, Route 1	04	06	08	09	13	15	17	18	24		101	102	103	104	105
	25	26	27	33	34	35	36	37	41		106	107	108	109	110
	45	48	50	56	59	75					111	112	113	114	115
											116	118	119	121	122
											123	126	127	128	
Set XIV, Route 2	04	06	08	09	13	15	17	18	24		101	102	103	104	105
	25	26	27	33	34	35	36	37	41		106	107	108	109	110
	45	48	50	56	59	75					111	112	113	114	115
											116	118	119	121	122
											123	126	127	128	
Set XIV, Route 3	04	06	08	09	13	15	17	18	24		101	102	103	104	105
	25	26	27	33	34	35	36	37	41		106	107	108	109	110
	45	48	50	56	59	75					111	112	113	114	115
											116	118	119	121	122
											123	126	127	128	
Set XIV, Route 4	04	06	08	09	13	15	17	18	24						
	25	26	27	33	34	35	36	37	41						
	45	48	50	56	59	75									
Set XIV, Route 5	04	06	08	09	13	15	17	18	24						
	25	26	27	33	34	35	36	37	41						
	45	48	50	56	59	75									
Set XIV, Route 6	04	06	08	09	13	15	17	18	24						
	25	26	27	33	34	35	36	37	41						
	45	48	50	56	59	75									
Set XV, Route 1	06	08	09	15	24	35					103	107	110	111	112
											128				

TABLE 4-4(A) (continued)
Ecological Resources

Route ID	VEGETATION										WILDLIFE				
	Identifiers										Identifiers				
Set XV, Route 2	06	08	09	13	15	17	18	24	25		101	102	103	104	105
	26	27	33	34	35	36	37	41	45		106	107	110	111	112
	48	50	56	59	75						114	126	127	128	
Connector I(R)	04	06	08	09	13	15	17	18	24		101	102	103	104	105
	25	26	27	33	34	36	37	41	45		106	107	110	111	112
	48	50	56	59	75						113	114	115	116	118
											119	121	122	123	126
											127				

TABLE 4-5 (A)
LAND USE
JURISDICTIONS AND EXISTING USES

Route ID	JURISDICTION Type	Miles Crossed	Ag Land (Miles)	EXISTING USES Category	Number Crossed
SET IX(R)-RTE 1	County and Other Public Land	27.0 13.9	22.4	Residential Extractive Livestock Feedlots	1 1 1
SET IX(R)-RTE 2	County and Other Public Land	36.5 22.3	11.1	Residential Commrc'l & Indstrl Extractive Livestock Feedlots Airport/Int Zone	3 1 5 2 1
SET IX(R)-RTE 3	County and Other Public Land State Land Military	31.6 22.4 8.4 14.4	2.0	Residential Commrc'l & Indstrl Extractive Livestock Feedlots Airport/Int Zone Restricted Military	3 1 4 1 1 2
SET XI(R)-RTE 1	County and Other Public Land	11.1 0.6	0.0	Extractive	1
SET XI(R)-RTE 2	County and Other Public Land	13.1 1.7	0.0	Extractive Airstrip	1 1
SET XI(R)-RTE 3	County and Other Public Land	11.7 0.7	0.0	Residential Livestock Feedlots	1 1
SET XI(R)-RTE 4	County and Other Public Land	11.9 0.7	0.0	Residential Livestock Feedlots	1 1
SET XI(R)-RTE 5	County and Other Public Land	12.3 0.7	0.0	Livestock Feedlots	1
SET XIII-RTE 1	County and Other Public Land Military	0.5 1.6 11.0	0.0	Restricted Military	1
SET XIII-RTE 2	County and Other Public Land Military	5.3 9.4 1.0	0.3		0
SET XIV-RTE 1	County and Other Public Land State Land Irrigation District Indian Reservation	11.7 25.5 3.3 4.2 4.8	6.5	Residential Commrc'l & Indstrl Livestock Feedlots	1 5 2
SET XIV-RTE 2	County and Other Public Land State Land Indian Reservation	25.6 13.3 4.4 1.1	17.7	Residential Commrc'l & Indstrl Livestock Feedlots Airstrip Airport/Int Zone	22 6 3 1 1
SET XIV-RTE 3	County and Other Public Land State Land Indian Reservation	25.6 13.3 4.4 1.1	17.7	Residential Commrc'l & Indstrl Livestock Feedlots Airstrip Airport/Int Zone	22 6 3 1 1
SET XIV-RTE 4	County and Other Public Land State Land Military Indian Reservation	6.6 27.2 0.4 4.7 7.0	1.2		0
SET XIV-RTE 5	County and Other Public Land State Land	7.6 19.4 0.2	0.6		0

TABLE 4-5(A) JURISDICTIONS AND EXISTING USES (Continued)

Route ID	JURISDICTION Type	Miles Crossed	Ag Land (Miles)	EXISTING USES Category	Number Crossed
SET XIV-RTE 5	(Continued)				
	Military	4.7			
	Irrigation District	4.2			
	Indian Reservation	4.8			
SET XIV-RTE 6	County and Other	6.9	2.0	Commrc'l & Indstrial	1
	Public Land	27.1		Extractive	1
	Irrigation District	4.2		Livestock Feedlots	1
	Indian Reservation	4.8			
SET XV-RTE 1	Public Land	5.8	0.0		0
SET XV-RTE 2	Public Land	5.1	0.0		0
CONNECTOR 1(R)	Public Land	20.7	0.0		0
ANCILLARY FACILITIES: 69kV TRANSMISSION LINE					
69 kV-RTE 1	County and Other	8.8	7.7	Residential	2
	Public Land	0.2		Commrc'l & Indstrial	1
	Incorporated Area	1.0		Livestock Feedlots	1
69 kV-RTE 2	County and Other	12.9	6.0		0
	Public Land	1.8			
	Incorporated Area	1.0			
69 kV-RTE 3	County and Other	28.2	18.3	Residential	38
	Public Land	5.9		Public & Quasi-Publi	1
	State Land	0.7		Commrc'l & Indstrial	9
	Incorporated Area	1.7			
69 kV-RTE 4	County and Other	33.9	22.9	Residential	41
	Public Land	17.4		Public & Quasi-Publi	1
	State Land	2.3		Commrc'l & Indstrial	11
	Military	0.3		Extractive	3
	Incorporated Area	1.7		Livestock Feedlots	3
ANCILLARY FACILITIES: 161kV TRANSMISSION LINE					
161 kV-RTE 1	County and Other	17.2	15.5	Residential	15
	Public Land	0.3		Commrc'l & Indstrial	1
				Airport/Int Zone	1
161 kV-RTE 2	County and Other	20.6	13.2	Residential	31
	Public Land	3.6		Commrc'l & Indstrial	2
				Extractive	1
				Airport/Int Zone	2

Source: Wirth Associates, Inc., Apr 1981

TABLE 4-6 (A)
LAND USE
TRANSPORTATION AND UTILITIES

Route ID	Rds/Hwy Crossed	Miles Rds/Hwy Paralleled	Utility Miles Paralleled	R.O.W. Type
SET IX(R)-RTE 1	32	7.0	0.0	
SET IX(R)-RTE 2	42	28.9	2.6 2.0 6.7	Railroad BLM Recmnd Utility Corder Canal
SET IX(R)-RTE 3	31	25.0	1.3 11.9 11.9	BLM Recmnd Utility Corder 161 kV Line 92 kV Line
SET XI(R)-RTE 1	8	0.6	0.0	
SET XI(R)-RTE 2	4	5.1	0.0	
SET XI(R)-RTE 3	8	1.4	0.0	
SET XI(R)-RTE 4	8	1.4	0.0	
SET XI(R)-RTE 5	8	1.1	0.0	
SET XIII-RTE 1	0	0.0	0.0	
SET XIII-RTE 2	2	0.0	4.8	BLM Recmnd Utility Corder
SET XIV-RTE 1	21	5.4	1.5 10.0 3.8 3.9 4.1 3.9	Railroad BLM Recmnd Utility Corder Pipeline Canal 69 kV Line 161 kV Line
SET XIV-RTE 2	32	15.8	1.5 10.4 3.8 12.7 1.0 0.6	Railroad BLM Recmnd Utility Corder Pipeline Canal 69 kV Line 161 kV Line
SET XIV-RTE 3	32	15.8	1.5 10.4 3.8 12.7 1.0 0.6	Railroad BLM Recmnd Utility Corder Pipeline Canal 69 kV Line 161 kV Line
SET XIV-RTE 4	12	5.9	2.8 11.4 0.4 1.0	BLM Recmnd Utility Corder Canal 69 kV Line 161 kV Line
SET XIV-RTE 5	12	2.6	2.8 2.9 0.4 1.0	BLM Recmnd Utility Corder Canal 69 kV Line 161 kV Line
SET XIV-RTE 6	17	8.1	6.9 3.1 6.7 0.8	BLM Recmnd Utility Corder Pipeline Canal 69 kV Line
SET XV-RTE 1	2	4.8	1.3 3.9	Canal 92 kV Line
SET XV-RTE 2	2	0.0	0.0	
CONNECTOR I(R)	5	0.0	15.9	Canal

Source: Wirth Associates, Inc., Apr 1981

TABLE 4-6(A) TRANSPORTATION AND UTILITIES (Continued)

Route ID	Rds/Hwy Crossed	Miles Rds/Hwy Paralleled	Utility Miles Paralleled	R.O.W. Type
ANCILLARY FACILITIES: 69kV TRANSMISSION LINE				
69 kV-RTE 1	4	9.9	6.2	Sub-Transmission Line
69 kV-RTE 2	7	14.3	3.8	Sub-Transmission Line
69 kV-RTE 3	30	29.1	4.2 16.8	161 kV Line Sub-Transmission Line
69 kV-RTE 4	32	42.0	3.4 19.1	161 kV Line Sub-Transmission Line
ANCILLARY FACILITIES: 161kV TRANSMISSION LINE				
161 kV-RTE 1	20	15.2	1.0 3.5 14.5	161 kV Line 92 kV Line Sub-Transmission Line
161 kV-RTE 2	27	19.6	7.9 1.0 1.0 3.5 19.0	Railroad BLM Recmnd Utility Cordr 161 kV Line 92 kV Line Sub-Transmission Line

Source: Wirth Associates, Inc., Apr 1981

TABLE 4-7 (A)
PLANNED LAND USES AND PARK, PRESERVATION AND RECREATION AREAS

	PLANNED LAND USES CROSSED		PARKS AND PRESERVATION AREAS CROSSED		RECREATION FACILITIES CROSSED	
	Type	Miles	Type	Miles	Type	Miles
SET IX(R)-RTE 1	Agriculture Open Space & Recretn Parks & Preservation	29.6 5.5 5.8	Proposed BLM ACEC	7.0	BLM Cnctrtd Use Zon Open Area Designtd Rds & Trls BLM Comp Event Area Vehicle Race Corldr	11.9 7.0 6.7 3.1 0.2
SET IX(R)-RTE 2	Agriculture Open Space & Recretn Parks & Preservation Industrial	39.1 4.0 12.8 2.7	Proposed BLM ACEC	1.4	BLM Cnctrtd Use Zon Open Area Designtd Rds & Trls	7.5 8.6 1.5
SET IX(R)-RTE 3	Agriculture Open Space & Recretn Parks & Preservation Military Residential Public & Quasi-Publi	34.9 12.5 12.8 2.0 6.0 8.4	Proposed BLM ACEC	2.6	BLM Cnctrtd Use Zon Open Area Designtd Rds & Trls	4.9 4.9 14.9
SET XI(R)-RTE 1	Agriculture Open Space & Recretn	0.4 11.3	Pro Ntnl Ntrl Lndmrk	0.7		
SET XI(R)-RTE 2	Agriculture Open Space & Recretn	0.2 14.6	Pro Ntnl Ntrl Lndmrk Coochama Exp Forest	1.7 3.1	Designtd Rds & Trls	0.6
SET XI(R)-RTE 3	Agriculture Open Space & Recretn	2.5 9.9	Pro Ntnl Ntrl Lndmrk	1.7		
SET XI(R)-RTE 4	Agriculture Open Space & Recretn	2.5 10.1	Pro Ntnl Ntrl Lndmrk	1.7		
SET XI(R)-RTE 5	Agriculture Open Space & Recretn	2.1 10.9	Pro Ntnl Ntrl Lndmrk	1.7		
SET XIII-RTE 1	Open Space & Recretn Military	2.1 11.0				
SET XIII-RTE 2	Open Space & Recretn Military	14.9 0.8				
SET XIV-RTE 1	Agriculture Open Space & Recretn Parks & Preservation Residential Commercial Industrial	7.0 32.8 1.2 0.9 0.2 3.8	BLM IWIU Area	7.7	BLM Cnctrtd Use Zon	0.2
SET XIV-RTE 2	Agriculture Open Space & Recretn Parks & Preservation Residential Commercial Industrial	20.8 16.1 0.2 4.2 0.9 2.8	BLM IWIU Area Proposed BLM ACEC	2.8 2.1	Colorado River	0.3

TABLE 4-7(A) PLANNED LAND USES, PARKS, PRESERVATION AND RECREATION AREAS (Continued)

	PLANNED LAND USES CROSSED		PARKS AND PRESERVATION AREAS CROSSED		RECREATION FACILITIES CROSSED	
	Type	Miles	Type	Miles	Type	Miles
SET XIV-RTE 3	Agriculture	20.8	BLM IWIU Area	2.8	Colorado River	0.3
	Open Space & Recretn	16.1	Proposed BLM ACEC	2.1		
	Parks & Preservation	0.2				
	Residential	4.2				
	Commercial	0.9				
	Industrial	2.8				
SET XIV-RTE 4	Agriculture	0.1	BLM IWIU Area	2.5	Colorado River	0.6
	Open Space & Recretn	34.6	Proposed BLM ACEC	4.5	BLM Cnctrtd Use Zon	1.1
	Parks & Preservation	2.2	Mittry Lake St Area	0.1		
	Urban	1.1				
	Military	4.7				
	Residential	1.9				
SET XIV-RTE 5	Agriculture	0.1	BLM IWIU Area	2.5	BLM Cnctrtd Use Zon	0.2
	Open Space & Recretn	27.6	Mittry Lake St Area	0.1		
	Parks & Preservation	1.8				
	Military	4.7				
	Industrial	2.5				
SET XIV-RTE 6	Agriculture	2.7	BLM IWIU Area	7.2	BLM Cnctrtd Use Zon	0.2
	Open Space & Recretn	32.4				
	Parks & Preservation	1.2				
	Industrial	2.5				
SET XV-RTE 1	Open Space & Recretn	5.8	Proposed BLM ACEC	0.5	BLM Cnctrtd Use Zon	4.3
SET XV-RTE 2	Open Space & Recretn	1.4	Proposed BLM ACEC	0.1	BLM Cnctrtd Use Zon	4.8
			Pot CA St Pres Area	2.5		
CONNECTOR 1(R)	Agriculture	0.5	Proposed BLM ACEC	3.8	BLM Cnctrtd Use Zon	2.1
	Open Space & Recretn	20.2				
ANCILLARY FACILITIES: 69kV TRANSMISSION LINE						
69 kV-RTE 1	Agriculture	8.8			Golf Course	0.9
	Open Space & Recretn	0.2			Athletic Field	0.3
	Residential	1.0				
69 kV-RTE 2	Agriculture	9.2			Golf Course	0.9
	Open Space & Recretn	1.8			Athletic Field	0.3
	Residential	3.3				
	Commercial	1.4				
69 kV-RTE 3	Agriculture	24.3			Golf Course	0.9
	Open Space & Recretn	3.8			Athletic Field	0.3
	Residential	4.4				
	Commercial	2.0				
	Industrial	2.0				
69 kV-RTE 4	Agriculture	33.8			Cmpgrnd/Day Use Area	1.5
	Open Space & Recretn	11.6			Golf Course	0.9
	Parks & Preservation	1.5			Athletic Field	0.3
	Military	0.3				
	Residential	4.4				
	Commercial	2.0				
	Industrial	2.0				
ANCILLARY FACILITIES: 161kV TRANSMISSION LINE						
161 kV-RTE 1	Agriculture	17.4	Proposed BLM ACEC	0.3	BLM Cnctrtd Use Zon	0.8
	Parks & Preservation	0.1			Designtd Rds & Trls	0.3
161 kV-RTE 2	Agriculture	20.7			BLM Cnctrtd Use Zon	3.8
	Parks & Preservation	1.0			Open Area	3.3
	Commercial	0.1			Designtd Rds & Trls	0.3
	Industrial	2.4				

Source: Wirth Associates, Inc., Apr 1981

TABLE 4-8(A)

PROJECTED TOTAL COST, ASSESSED VALUE AND TAX REVENUES
 ROUTES AND ASSOCIATED SCHOOL DISTRICTS
 (1979 TAX SCHEDULES)
 BY ROUTE
 (1979 DOLLARS)

Route	Primary Tax-Rate Area	County	Total Cost (\$000)	Assessed Value (\$000)
Set IX(R)	Imperial Valley			
Route 1	68, 57, 66, 74, 69	Imperial	13,231	2,646
Route 2	68, 69, 56	Imperial	18,986	3,797
Route 3	68, 69, 56, 90	Imperial	24,961	4,993
Set XI(R)	Tecate Peak			
Route 1	91000 79000	San Diego	4,253	851
Route 2	91000 79000	San Diego	5,380	1,076
Route 3	91000 79000	San Diego	2,635	527
Route 4	91000 79000	San Diego	2,928	586
Route 5	91000 79000	San Diego	3,708	742
Set XIII	Muggins Mountains			
Route 1	01, 24	Yuma	4,258	1,341
Route 2	01, 24	Yuma	4,949	1,559

TABLE 4-8(A) (continued)
 Projected Total Cost, Assessed Value and Tax Revenues

Route	Primary Tax-Rate Area	County	Total Cost (\$000)	Assessed Value (\$000)
Set XIV	Yuma			
Route 1	01, 94000	Yuma, Imperial	11,074	2,996
Route 2	01, 13, 11 94000	Yuma, Imperial	13,491	3,898
Route 3	01, 13, 11 94000	Yuma, Imperial	13,491	3,898
Route 4	01, 13, 94000	Yuma, Imperial	13,112	2,535
Route 5	01, 94000	Yuma, Imperial	8,463	1,562
Route 6	01, 94000	Yuma, Imperial	9,248	2,420
Set XV	Sand Hills			
Route 1	94000	Imperial	2,622	524
Route 2	94000	Imperial	1,903	308
Connector 1(R)				
	94000 57000 68000	Imperial	6,610	1,322

Source: Wirth Associates, Inc. 1981 (Derived from information provided by Mountain West Research, Inc.)

TABLE 4-9 (A)
VISUAL CHARACTERISTICS
TOTAL MILES/ROUTE

Route ID	Management Class			
	I	II	III	IV
SET IX(R)-RTE 1	0.0	25.6	15.3	0.0
SET IX(R)-RTE 2	0.0	28.5	17.0	13.3
SET IX(R)-RTE 3	0.0	20.0	27.8	29.0
SET XI(R)-RTE 1	0.0	9.2	2.5	0.0
SET XI(R)-RTE 2	3.0	1.9	7.6	2.3
SET XI(R)-RTE 3	0.0	6.7	5.7	0.0
SET XI(R)-RTE 4	0.0	6.9	5.7	0.0
SET XI(R)-RTE 5	0.0	7.0	6.0	0.0
SET XIII-RTE 1	0.0	12.1	1.0	0.0
SET XIII-RTE 2	0.0	14.0	1.7	0.0
SET XIV-RTE 1	0.0	16.5	5.7	23.1
SET XIV-RTE 2	0.0	26.0	5.6	12.8
SET XIV-RTE 3	0.0	26.0	5.6	12.8
SET XIV-RTE 4	0.0	15.3	2.5	28.1
SET XIV-RTE 5	0.0	12.2	0.9	23.6
SET XIV-RTE 6	0.0	14.4	4.7	19.7
SET XV-RTE 1	0.0	5.6	0.0	0.2
SET XV-RTE 2	0.0	4.8	0.0	0.3
CONNECTOR I(R)	0.0	0.3	0.0	20.4
ANCILLARY FACILITIES: 69kV TRANSMISSION LINE				
69 kV-RTE 1	0.0	8.4	1.6	0.0
69 kV-RTE 2	0.0	6.8	3.4	5.5
69 kV-RTE 3	0.0	25.7	5.1	5.7
69 kV-RTE 4	0.0	39.8	7.9	7.9
ANCILLARY FACILITIES: 161kV TRANSMISSION LINE				
161 kV-RTE 1	0.0	16.6	0.9	0.0
161 kV-RTE 2	0.0	16.6	7.6	0.0

Source: Wirth Associates, Inc., Apr 1981

TABLE 4-10 (A)
ARCHAEOLOGICAL RESOURCES
TOTAL MILES/ROUTE

Route ID	High	Probability Mod	Low	Special Areas
SET IX(R)-RTE 1	15.3	1.1	24.5	0.0
SET IX(R)-RTE 2	8.9	1.0	34.7	14.2
SET IX(R)-RTE 3	26.2	6.1	23.1	21.4
SET XI(R)-RTE 1	4.4	5.2	2.1	0.0
SET XI(R)-RTE 2	2.5	9.6	2.7	0.0
SET XI(R)-RTE 3	6.0	5.2	1.2	0.0
SET XI(R)-RTE 4	5.8	4.9	1.9	0.0
SET XI(R)-RTE 5	6.3	5.4	1.3	0.0
SET XIII-RTE 1	6.5	6.6	0.0	0.0
SET XIII-RTE 2	15.3	0.4	0.0	0.0
SET XIV-RTE 1	16.5	3.4	17.0	8.4
SET XIV-RTE 2	5.9	3.0	33.6	1.9
SET XIV-RTE 3	5.9	3.0	33.6	1.9
SET XIV-RTE 4	23.5	2.6	7.0	12.8
SET XIV-RTE 5	18.0	3.4	6.9	8.4
SET XIV-RTE 6	17.1	3.4	9.9	8.4
SET XV-RTE 1	1.2	0.0	4.6	0.0
SET XV-RTE 2	1.4	1.8	1.9	0.0
CONNECTOR 1(R)	10.2	6.7	0.5	3.3
ANCILLARY FACILITIES: 69kV TRANSMISSION LINE				
69 kV-RTE 1	0.0	1.4	8.6	0.0
69 kV-RTE 2	0.0	4.0	11.7	0.0
69 kV-RTE 3	2.4	5.0	29.1	0.0
69 kV-RTE 4	11.6	5.0	39.0	0.0
ANCILLARY FACILITIES: 161kV TRANSMISSION LINE				
161 kV-RTE 1	0.8	0.2	16.5	0.0
161 kV-RTE 2	4.5	2.4	17.3	0.0

Source: Wirth Associates, Inc., Apr 1981

TABLE 4-11(A)
HISTORIC RESOURCES BY ROUTE

ROUTE ID.	LINK ASSOCIATION	SITE #	SITE NAME/TYPE	OFFICIAL STATUS	ROW CROSSES RESOURCE	LOCATION	
						RESOURCE WITHIN 1 MILE OF ROW	LINEAR FEATURES PARALLEL TO ROW & WITHIN 1 MILE OF ROW
SET IX(R) ROUTE 1	129, 138	236	Anza Expedition Route	NOS	X		
	129	242	Kearney (Army of the West) Mexican War Military Route	NOS	X		
	129	228	Southern Pacific Railroad Niland-Calexico Branch	NOS	X		
	129	207	Butterfield Overland Mail Company Route	NOS	X		
	129	233	San Diego to Fort Yuma Road	AR	X		
	129	234	Lyon's Crossing New River Crossing	NOS	X		
	129	205	Mormon Battalion (Cooke's) Route Mexican War Military Wagonroad	NOS	X		
	133		No Sites				
	130		No Sites				
	132	228	Southern Pacific Railroad Niland-Calexico Branch	NOS	X		
SET IX(R) ROUTE 2	132, 136, 138	236	Anza Expedition Route	NOS	X		
	136	242	Kearney Route	NOS	X		
	136	240	San Diego and Arizona (Eastern) Railway	NOS, AR	X		
	136	229	Plaster City Gypsum Processing Plant	NOS		X	

TABLE 4-11(A) (continued)
Historic Resources by Route

ROUTE ID.	LINK ASSOCIATION	SITE #	SITE NAME/TYPE	OFFICIAL STATUS	ROW CROSSES RESOURCE	LOCATION	
						RESOURCE WITHIN 1 MILE OF ROW	LINEAR FEATURES PARALLEL TO ROW & WITHIN 1 MILE OF ROW
SET IX(R) ROUTE 3	130		No Sites				
	132	228	Southern Pacific Railroad Niland-Calexico Branch	NOS	X		
	132, 116	236	Anza Expedition Route	NOS	X		
	135		No Sites				
	116	235	Fages Route 18th Century Exploration Route	NOS	X		
	116	255	Plaster City Railroad Industrial Railroad	NOS	X		
SET XI(R) ROUTE 1	116	205, 207	Southern Emigrant Route/ Butterfield Overland Mail Company Road	NOS	X		
	145a, b	233	San Diego to Fort Yuma Road	AR			X
	145b	246	"East Line" Telegraph-Telephone Line	AR		X	
	145d	243	Clark Ranch	NOS		X	
	145d	257	Dulzura (Hagenbuck Store, Dulzura Inn)	NOS		X	
	145d	231	Mocogo Ranch	NOS			
SET XI(R) ROUTE 2	146a	232	Donahue Mining Claims	NOS			
			Gold Mining Operations				
	146b	231	Mocogo Ranch	NOS			

TABLE 4-11(A) (continued)
Historic Resources by Route

ROUTE ID.	LINK ASSOCIATION	SITE #	SITE NAME/TYPE	OFFICIAL STATUS	ROW CROSSES RESOURCE	LOCATION	
						RESOURCE WITHIN 1 MILE OF ROW	LINEAR FEATURES PARALLEL TO ROW & WITHIN 1 MILE OF ROW
SET XI(R) ROUTE 3	145a, 155, 157	233	San Diego to Fort Yuma Road	AR	X	X	
	157	261	Barrett School	NOS		X	
	157	262	Smith Ranch	NOS		X	
	157	263	Iron Bridge	NOS		X	
	157	264	San Diego City Conduit	NOS		X	
	157	265	Scheckler Ranch	NOS		X	
	159	232	Donahue Mining Claims	NOS		X	
	146b	231	Mocogo Ranch	NOS			
SET XI(R) ROUTE 4	145a, 145b, 156	233	San Diego to Fort Yuma Road	AR	X	X	
	145b	246	"East Line" Telegraph-Telephone Line	AR		X	
	157	261	Barrett School	NOS		X	
	157	262	Smith Ranch	NOS		X	
	157	263	Iron Bridge	NOS		X	
	159	232	Donahue Mining Claims	NOS		X	
	146b	231	Mocogo Ranch	NOS			
	145a, 145b, 158	233	San Diego to Fort Yuma Road	AR		X	
SET XI(R) ROUTE 5	145b	246	"East Line" Telegraph-Telephone Line	AR		X	
	158	264	San Diego City Conduit	NOS		X	

TABLE 4-11(A) (continued)
Historic Resources by Route

ROUTE ID.	LINK ASSOCIATION	SITE #	SITE NAME/TYPE	OFFICIAL STATUS	ROW CROSSES RESOURCE	LOCATION		LINEAR FEATURES PARALLEL TO ROW & WITHIN 1 MILE OF ROW
						RESOURCE WITHIN 1 MILE OF ROW		
SET XII(R)	159	232	Donahue Mining Claims	NOS				
ROUTE 5 (continued)	146b	231	Mocogo Ranch	NOS				
SET XIII ROUTE 1			No Sites					
SET XIII ROUTE 2			No Sites					
SET XIV ROUTE 1	36,37,44 37	153 156	Gila Trail Dome Railroad Station	NOS NOS	X		X	X
	37	10	Historic Anglo Dump Area	AR				
	37	10	Gila City Placer Gold Mining Town	ASHP				
	37	101	San Papago Village	AR				
	38	151	Southern Pacific Railroad	NOS			X	
	38	46	Blaisdell Railroad Station	ASHP			X	
	49,51	300	Laguna Cemetery	NOS			X	
	49,51	322	Placer Mining Site	AR				
	51	217	Laguna Dam	NOS			X	
	51,101	208	Potholes Placer Gold Mining Town	NOS			X	
	51,101	204a	San Pedro y San Pablo de Bicuener Spanish Mission Settlement	CHL921			X	

TABLE 4-11(A) (continued)
Historic Resources by Route

ROUTE ID.	LINK ASSOCIATION	SITE #	SITE NAME/TYPE	OFFICIAL STATUS	ROW CROSSES RESOURCE	RESOURCE WITHIN 1 MILE OF ROW	LOCATION	
							LINEAR FEATURES PARALLEL TO ROW & WITHIN 1 MILE OF ROW	
SET XIV ROUTE 1 (continued)	51, 101	204b	Potholes Cemetery	CL		X		
	110a	261	Picacho Road	NOS	X			
	162	224a	Camp Pilot Knob	NOS		X		
	162	209	Southern Pacific Railroad	NOS	X			
	36, 37	153	Gila Trail	NOS	X	X		
SET XIV ROUTE 2	37	156	Dome Railroad Station	NOS		X		
	37	10	Historic Anglo Dump Area	AR				
	37	10	Gila City Placer Gold Mining Town	ASHP				
	37	101	Sand Papago Village	AR				
	38, 43, 56	151	Southern Pacific Railroad	NOS		X		
	38	46	Blaisdell Railroad Station	ASHP		X		
	67, 70	153	Gila Trail/Kearny (Army of the West) Route	NOS	X			
	124a	219	Hanlon Heading Imperial Valley Canal Headgate	HM		X		
	124a	202	Pilot Knob	NOS		X		
	124a	226a	Pilot Knob Historic Native American Site	Potential ACEC				

TABLE 4-11(A) (continued)
Historic Resources by Route

ROUTE ID.	LINK ASSOCIATION	SITE #	SITE NAME/TYPE	OFFICIAL STATUS	ROW CROSSES RESOURCE	LOCATION	
						RESOURCE WITHIN 1 MILE OF ROW	LINEAR FEATURES PARALLEL TO ROW & WITHIN 1 MILE OF ROW
SET XIV ROUTE 3	36,37	153	Gila Trail	NOS	X	X	
	37	156	Dome Railroad Station	NOS		X	
	37	10	Historic Anglo Dump Area	AR			
	37	10	Gila City Placer Gold Mining Town	ASHP			
	37	101	San Papaga Village	AR			
	38,43,56	151	Southern Pacific Railroad	NOS		X	
	38	46	Blaisdell Railroad Station	ASHP		X	
	67,70	153	Gila Trail/Kearny (Army of the West) Route	NOS	X		
	124a	219	Hanlon Heading Imperial Valley Canal Headgate	HM		X	
	124a	202	Pilot Knab	NOS		X	
SET XIV ROUTE 4	124a	226a	Pilot Knab Historic Native American Site	Potential ACEC			
	51	217	Laguna Dam	NOS		X	
	51	300	Laguna Cemetery	(Potential NR, Arizona) NOS			X

TABLE 4-11(A) (continued)
Historic Resources by Route

ROUTE ID.	LINK ASSOCIATION	SITE #	SITE NAME/TYPE	OFFICIAL STATUS	ROW CROSSES RESOURCE	LOCATION		LINEAR FEATURES PARALLEL TO ROW & WITHIN 1 MILE OF ROW
						RESOURCE WITHIN 1 MILE OF ROW		
SET XIV ROUTE 4 (continued)	51	322	Placer Mining Site	AR	X		X	
	51, 101	208	Potholes Placer Gold Mining Town	NOS			X	
	51, 101	204a	San Pedro y San Pablo de Bicuener Spanish Mission Settlement	CHL-921			X	
	51, 101	204b	Potholes Cemetery	CL			X	
	78, 86	121	Los Flores Placers	NOS			X	
	82	16 (also 217)	Laguna Dam (and Syphon) Diversion (Wier) Dam	Potential NR			X	
	86	260	Muggins Mesa Yuma Proving Ground Fluffy Dust Course	NOS			X	
	86, 70	153	Gila Trail (also Butterfield Overland Mail Company Road)	NOS			X	
	110a	261	Picacho Road	NOS	X			
	117b	259	Picacho Mining Trail	NOS	X			
	117b, 160, 161	224a	Camp Pilot Knob	NOS			X	
	124a, 161	219	Hanlon Heading Imperial Valley Canal Headgate	HM			X	
	124a, 161	202	Pilot Knob	NOS			X	
	124a, 161	226a	Pilot Knob Historic Native American Site	Potential ACEC				

TABLE 4-11(A) (continued)
Historic Resources by Route

ROUTE ID.	LINK ASSOCIATION	SITE #	SITE NAME/TYPE	OFFICIAL STATUS	ROW CROSSES RESOURCE	LOCATION	
						RESOURCE WITHIN 1 MILE OF ROW	LINEAR FEATURES PARALLEL TO ROW & WITHIN 1 MILE OF ROW
SET XIV ROUTE 4 (continued)	160	151	Southern Pacific Railroad	NOS	X		
	160	224b	Camp Pilot Knob Medical Corps Facility	NOS		X	
	160, 161	225	Carlson Homestead Ploughed Fields (Desert Pavement)	NOS		X	
	165	259	Picacho Mining Trail	NOS	X	X	
	165	267	Cargo Muchacho Mine	NOS		X	
SET XIV ROUTE 5	51	217	Laguna Dam	NOS (Potential NR, Arizona)		X	
	51	300	Laguna Cemetery	NOS		X	
	51	322	Placer Mining Site	AR	X	X	
	51, 101	208	Potholes Placer Gold Mining Town	NOS		X	
	51, 101	204a	San Pedro y San Pablo de Bicuener Spanish Mission Settlement	CHL 921		X	
	51, 101	204b	Potholes Cemetery	CL		X	
	78, 86	121	Los Flores Placers	NOS		X	
	82	16 (also 217)	Laguna Dam (and Syphon Diversion (Wier) Dam	Potential NR		X	

TABLE 4-11(A) (continued)
Historic Resources by Route

ROUTE ID.	LINK ASSOCIATION	SITE #	SITE NAME/TYPE	OFFICIAL STATUS	ROW CROSSES RESOURCE	LOCATION	
						RESOURCE WITHIN 1 MILE OF ROW	LINEAR FEATURES PARALLEL TO ROW & WITHIN 1 MILE OF ROW
SET XIV ROUTE 5 (continued)	86	260	Muggins Mesa Yuma Proving Ground Fluffy Dust Course	NOS		X	
	86	153	Gila Trail (also Butterfield Overland Mail Company Road)	NOS		X	
	110a	261	Picacho Road	NOS	X		
	162	202	Camp Pilot Knob	NOS		X	
		209	Southern Pacific Railroad	NOS	X		
	165	259	Picacho Mining Trail	NOS		X	
	165	267	Cargo Muchacho Mine	NOS		X	
	36, 37, 40b 37	153 156	Gila Trail Dome Railroad Station	NOS NOS	X	X X	
SET XIV ROUTE 6	37	10	Historic Anglo Dump Area	AR			
	37	10	Gila City Placer Gold Mining Town	ASHP			
	37	101	San Papago Village	AR			
	49, 51	300	Laguna Cemetery	NOS		X	
	49, 51	322	Placer Mining Site	AR			
	51	217	Laguna Dam	NOS		X	
	51, 101	208	Potholes Placer Gold Mining Town	NOS		X	

TABLE 4-11(A) (continued)
Historic Resources by Route

ROUTE ID.	LINK ASSOCIATION	SITE #	SITE NAME/TYPE	OFFICIAL STATUS	ROW CROSSES RESOURCE	RESOURCE WITHIN 1 MILE OF ROW	LOCATION	LINEAR FEATURES PARALLEL TO ROW & WITHIN 1 MILE OF ROW
SET XIV ROUTE 6 (continued)	51, 101	204a	San Pedro y San Pablo de Bicuñer	CHL 921			X	
	51, 101	204b	Spanish Mission Settlement	CL			X	
	110a	261	Potholes Cemetery	NOS				
	162	224a	Picacho Road	NOS	X			
	162	209	Camp Pilot Knob	NOS			X	
	165	259	Southern Pacific Railroad	NOS	X			
	165	267	Picacho Mining Trail	NOS	X		X	
SET XV ROUTE 1			Cargo Muchacho Mine	NOS			X	
	126A	216	Yuma Plank Road	CHL 845 Potential NFR			X	
SET XV ROUTE 2	128a	216	Yuma Plank Road	CHL 845 Potential NFR				
CONNECTOR 1(R)	128b, 128c	216	Yuma Plank Road	CHL 845 Potential NFR			X	
Yucca (69kV)	212	153	Gila Trail (also Butterfield Overland Mail Company Road)	NOS	X			
Gila (69kV)	209	324	Unit "B" Lift Pumping Plant (Pump House Restaurant)	NOS			X	
North Gila (69kV)	206, 210, 211	28	San Ysidro Hacienda (Redondo Ruins)	NFR			X	

TABLE 4-11(A) (continued)
Historic Resources by Route

ROUTE ID.	LINK ASSOCIATION	SITE #	SITE NAME/TYPE	OFFICIAL STATUS	ROW CROSSES RESOURCE	LOCATION	
						RESOURCE WITHIN 1 MILE OF ROW	LINEAR FEATURES PARALLEL TO ROW & WITHIN 1 MILE OF ROW
North Gila (69kV) (continued)	209	324	Unit "B" Life Pumping Plant (Pump House Restaurant)				
	211	323	Peter T. Robertson Residence	Potential NR		X	
	211	153	Gila Trail	NOS	X	X	
Dome Valley (69kV)	201, 202	121	Los Flores Placers	NOS	X	X	
	201, 202, 203	327	Adobe Ruins	AR	X	X	
	201, 202	18	McPhaul Bridge	ASHP		X	
	201, 202	144	McPhaul Placers	NOS		X	
	201, 202, 203	328	Mining Camp	AR		X	
	201, 211	28	San Ysidro Hacienda (Redondo Ruins)	NR		X	
	202, 203	151	Southern Pacific Railroad	NOS	X	X	
	202, 203, 211	153	Gila Trail (also Butterfield Overland Mail Company Road)	NOS	X	X	
	203	46	Blaisdell Railroad Station	ASHP		X	
	209	324	Unit "B" Lift Pumping Plant (Pump House Restaurant)	NOS		X	
211		323	Peter T. Robertson Residence	Potential NR		X	

Table 4-11(A) (continued)
Historic Resources by Route

ROUTE ID.	LINK ASSOCIATION	SITE #	SITE NAME/TYPE	OFFICIAL STATUS	ROW CROSSES RESOURCE	LOCATION	
						RESOURCE WITHIN 1 MILE OF ROW	LINEAR FEATURES PARALLEL TO ROW & WITHIN 1 MILE OF ROW
B-2, B-D (161kV)	B-2	205	Mormon Battalion (Cooke's) Route	NOS	X		
	B-2	207	Southern Emigrant/Butterfield Overland Mail Company Route	NOS	X		
	B-2	233	San Diego to Yuma Road	AR		X	
	B-2	240	San Diego and Arizona Eastern Railway	NOS, AR Potential Interpretive Site			X
	B-2	268	Dixieland School	NOS		X	
	B-2	269	Dixieland	NOS		X	
D-2, B-D (161kV)	B-2	270	Seeley	NOS		X	
	B-D	260	Blue Lake/Silsbee Cattle Feeding Place	HM		X	
	B-D	267	Silsbee School and John W. Kramar Residence	NOS	X		
	B-D	236	Anza Expedition Route	NOS	X	X	
	B-D	228	Southern Pacific Railroad	NOS	X		
	B-D	242	Kearny (Army of the West) Route	NOS	X	X	
	D-2	207	Southern Emigrant/Butterfield Overland Mail Company Route	NOS	X	X	
	D-2	271	El Centro Station, Southern Pacific Railroad	NOS		X	

TABLE 4-11(A) (continued)
Historic Resources by Route

ROUTE ID.	LINK ASSOCIATION	SITE #	SITE NAME/TYPE	OFFICIAL STATUS	ROW CROSSES RESOURCE	LOCATION	
						RESOURCE WITHIN 1 MILE OF ROW	LINEAR FEATURES PARALLEL TO ROW & WITHIN 1 MILE OF ROW
D-2,B-D (161kV) (continued)	B-D	260	Blue Lake/Silsbee Cattle Feeding Place	HM		X	
	B-D	267	Silsbee School and John W. Kramar Residence	NOS	X		
	B-D	236	Anza Expedition Route	NOS	X	X	
	B-D	228	Southern Pacific Railroad	NOS	X		
	B-D	242	Kearny (Army of the West) Route	NOS	X	X	

TABLE 4-12 (A)
NATIVE AMERICAN CULTURAL RESOURCES

Site Categories			
a = Religion and Ritual			
b = Food Resources			
c = Other Resources			
d = Trade			
e = Habitation			
f = Trails			
g = Historical Events			
i = Rock Art			
m = Multiple Resource Area			
Route ID	Site ID	Site Category	Site Type
SET IX(R)-RTE 1			
	674	m	Multiple Resource Area
	262	b	Planting Area
	361	d	Trade Area
	379	e	Village
	461	e	Village
	630	f	Trail
	265	b	Gathering Area
	266	b	Water Source
	294	b	Salt Source
	460	e	Village
SET IX(R)-RTE 2			
No Identifiable Impacts			
SET IX(R)-RTE 3			
	005	a	Sacred Hills
	030	a	Burial/Cremation
	047	b	Planting Area
	098	e	Village
	099	e	Village
	121	e	Village Area
	397	e	Village Area
	456	e	Village
	150	f	Trail
SET XI(R)-RTE 1			
	102	e	Village Area
	016	a	Burial Area
	118	e	Village Area
	382	e	Village
	006	a	Sacred Mountain
	116	e	Village Area
	031	b	Gathering Area
	032	b	Gathering Area
	049	b	Gathering Area
	091	e	Village Area
	380	e	Village
	166	g	Battle Site
SET XI(R)-RTE 2			
	102	e	Village Area
	016	a	Burial Area
	118	e	Village Area
	006	a	Sacred Mountain
	032	b	Gathering Area
	101	e	Village Area
SET XI(R)-RTE 3			
	102	e	Village Area
	016	a	Burial Area
	118	e	Village Area
	382	e	Village
	006	a	Sacred Mountain
	116	e	Village Area
	032	b	Gathering Area
	101	e	Village Area

TABLE 4-12(A) NATIVE AMERICAN CULTURAL RESOURCES (Continued)

Route ID	Site ID	Site Category	Site Type
SET XI(R)-RTE 4	102	e	Village Area
	016	a	Burial Area
	118	e	Village Area
	382	e	Village
	006	a	Sacred Mountain
	116	e	Village Area
	032	b	Gathering Area
	101	e	Village Area
SET XI(R)-RTE 5	102	e	Village Area
	016	a	Burial Area
	118	e	Village Area
	382	e	Village
	006	a	Sacred Mountain
	116	e	Village Area
	032	b	Gathering Area
	101	e	Village Area
SET XIII-RTE 1	716	a	Sacred Peak
SET XIII-RTE 2	716	a	Sacred Peak
SET XIV-RTE 1	717	a	Sacred Peak
	857	e	General Habitation
	252	a	Cemetery
	253	a	Cemetery
	139	e	Reservation
	140	e	Village
	614	e	Village
	615	e	Village
	172	g	Battle Site
	173	g	Battle Site
	672	m	Multiple Resource Area
	155	f	Trail
	670	m	Multiple Resource Area
	248	a	Sacred Hills
SET XIV-RTE 2	715	a	Sacred Peak
	717	a	Sacred Peak
	857	e	General Habitation
	705	a	Cemetery
	139	e	Reservation
	670	m	Multiple Resource Area
	617	e	Village
	618	e	Village
	661	e	Village
	652	i	Intaglio
	653	i	Intaglio
	061	b	Planting Area
	248	a	Sacred Hills
	299	b	Gathering Area
	801	e	Reservation
	804	e	General Habitation
SET XIV-RTE 3	715	a	Sacred Peak
	717	a	Sacred Peak
	857	e	General Habitation
	705	a	Cemetery
	139	e	Reservation
	670	m	Multiple Resource Area
	617	e	Village
	618	e	Village
	661	e	Village
	652	i	Intaglio
	653	i	Intaglio
	061	b	Planting Area
	248	a	Sacred Hills
	299	b	Gathering Area
	801	e	Reservation
	804	e	General Habitation

TABLE 4-12(A) NATIVE AMERICAN CULTURAL RESOURCES (Continued)

Route ID	Site ID	Site Category	Site Type
SET XIV-RTE 4			
	705	a	Cemetery
	837	e	Village
	950	i	Petroglyphs
	252	a	Cemetery
	253	a	Cemetery
	139	e	Reservation
	140	e	Village
	614	e	Village
	615	e	Village
	172	g	Battle Site
	173	g	Battle Site
	672	m	Multiple Resource Area
	155	f	Trail
	670	m	Multiple Resource Area
	617	e	Village
	618	e	Village
	661	e	Village
	652	i	Intaglio
	653	i	Intaglio
	061	b	Planting Area
	248	a	Sacred Hills
	299	b	Gathering Area
SET XIV-RTE 5			
	837	e	Village
	950	i	Petroglyphs
	252	a	Cemetery
	253	a	Cemetery
	139	e	Reservation
	140	e	Village
	614	e	Village
	615	e	Village
	172	g	Battle Site
	173	g	Battle Site
	672	m	Multiple Resource Area
	155	f	Trail
	670	m	Multiple Resource Area
	248	a	Sacred Hills
SET XIV-RTE 6			
	715	a	Sacred Peak
	717	a	Sacred Peak
	857	e	General Habitation
	252	a	Cemetery
	253	a	Cemetery
	139	e	Reservation
	140	e	Village
	614	e	Village
	615	e	Village
	172	g	Battle Site
	173	g	Battle Site
	672	m	Multiple Resource Area
	155	f	Trail
	670	m	Multiple Resource Area
	248	a	Sacred Hills
SET XV-RTE 1			
	061	b	Planting Area
	248	a	Sacred Hills
	299	b	Gathering Area
SET XV-RTE 2			
	061	b	Planting Area
	248	a	Sacred Hills
	299	b	Gathering Area
	254	a	Burial/Cremation
CONNECTOR 1(R)			
	254	a	Burial/Cremation

TABLE 4-12(A) NATIVE AMERICAN CULTURAL RESOURCES (Continued)

Route ID	Site ID	Site Category	Site Type
ANCILLARY FACILITIES: 69kV TRANSMISSION LINE			
69 kV-RTE 1	705	a	Cemetery
	806	e	General Habitation
69 kV-RTE 2	No Identifiable Impacts		
69 kV-RTE 3	836	e	Village
69 kV-RTE 4	715	a	Sacred Peak
	717	a	Sacred Peak
	837	e	Village
	950	i	Petroglyphs
	714	a	Sacred Mountain
	859	e	General Habitation
	901	g	Battle Site
	836	e	Village
ANCILLARY FACILITIES: 161kV TRANSMISSION LINE			
161 kV-RTE 1	674	m	Multiple Resource Area
	262	b	Planting Area
	263	b	Fishing Area
	264	b	Gathering Area
	361	d	Trade Area
	113	e	Village
	378	e	Village Area
	379	e	Village
	461	e	Village
	630	f	Trail
	265	b	Gathering Area
	266	b	Water Source
	267	b	Planting Area
161 kV-RTE 2	674	m	Multiple Resource Area
	262	b	Planting Area
	263	b	Fishing Area
	264	b	Gathering Area
	361	d	Trade Area
	113	e	Village
	378	e	Village Area
	379	e	Village
	461	e	Village
	462	e	Village
	630	f	Trail
	265	b	Gathering Area
	266	b	Water Source
	267	b	Planting Area

Source: Wirth Associates, Inc., Apr 1981

TABLE 4-13(A)
ASSESSED VALUE AND ASSOCIATED TAX-RATE AREAS
Ancillary Facilities 1979 Dollars

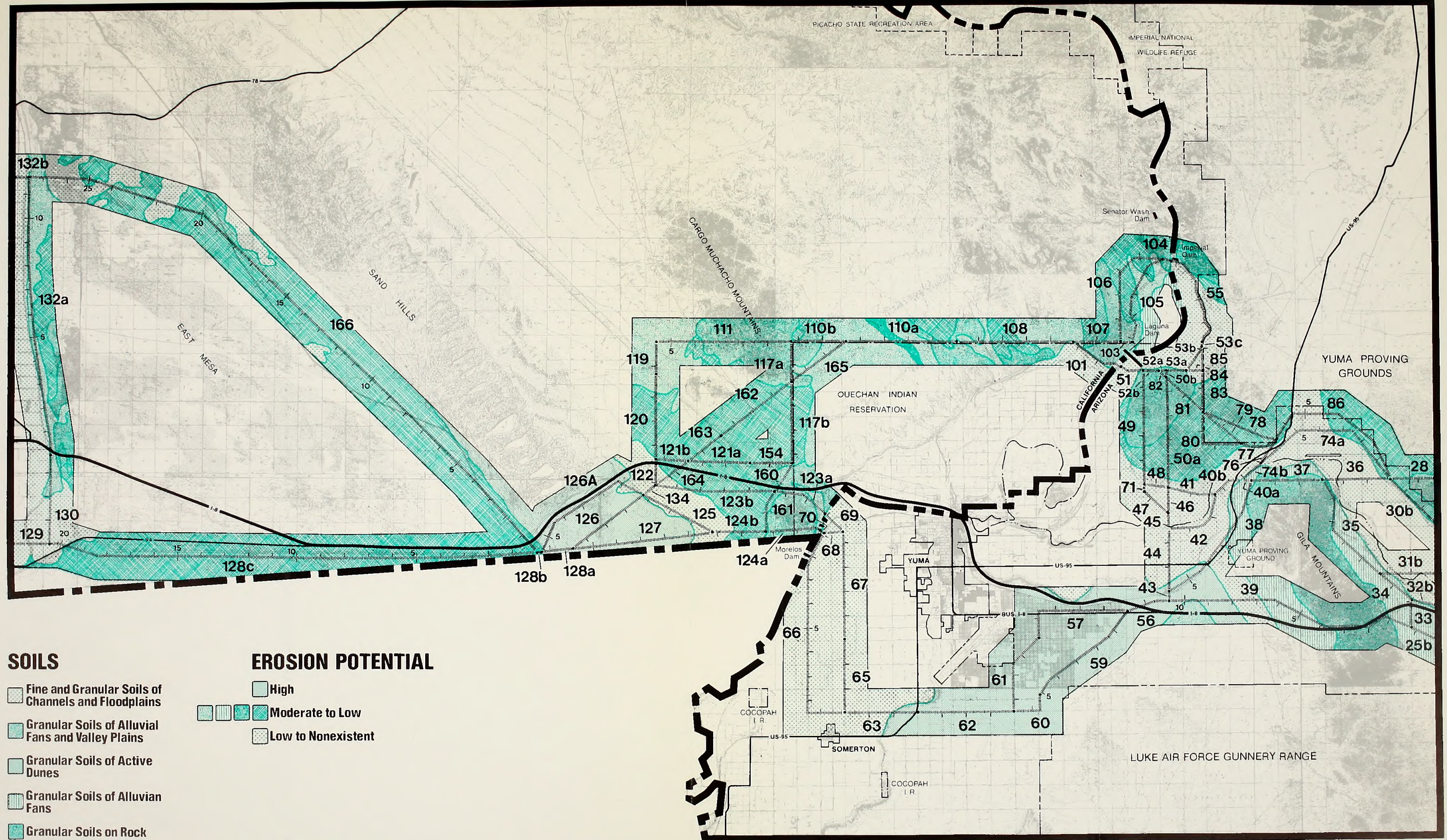
Facility/Site	County	Taxing Jurisdictions*	Assessed Value (\$000s)	Tax Rate (Per \$100)
<u>Substations</u>				
Yucca	Yuma	2430	\$ 4,458	14.3381
Gila	Yuma	01	4,298	11.4348
Narth Gila	Yuma	01	4,805	11.4348
Dome Valley	Yuma	01	4,805	11.4348
<u>69kV Transmission Line Alternatives</u>				
Yucca Alternatives	Yuma	13	176	12.3798
		01	25	11.4348
			201	
Gila Alternatives	Yuma	01	351	11.4348
North Gila Alternatives	Yuma	01	837	11.4348
			17	13.5001 ^a
			854	
Dome Valley Alternatives	Yuma	01	1,171	11.4348
			14	13.5001 ^a
			1,185	
<u>161kV Transmission Line Alternatives</u>				
Alternative D-2, B-D	Imperial	69000	78	4.0648
		85000	320	4.4507
		74000	203	4.1623
		62000	155	4.5129
			756	
Alternative B-2, B-D	Imperial	69000	397	4.0648
		85000	290	4.4507
		74000	203	4.1623
		62000	155	4.5129
			1,045	
<u>Microwave Facilities</u>				
San Miguel Mauntain		01	46,300	11.4348
Mission Central Center ^b				

* California taxing jurisdictions are tax-rate areas; the Arizona taxing jurisdiction is a tax-area code.

a The higher tax-rate applies to that portion of jurisdiction 01 which is within Yuma city limits.

b Not applicable to facility.

Source: Mountain West Research, Inc., February 1981.



APS/SDG&E INTERCONNECTION PROJECT Phase II Environmental Studies - SDES

Figure 4-1(A)

prepared by:
WIRTH ASSOCIATES

0 1 2 3 4 5 Miles

APS/SDG&E INTERCONNECTION PROJECT Phase II Environmental Studies-SDES

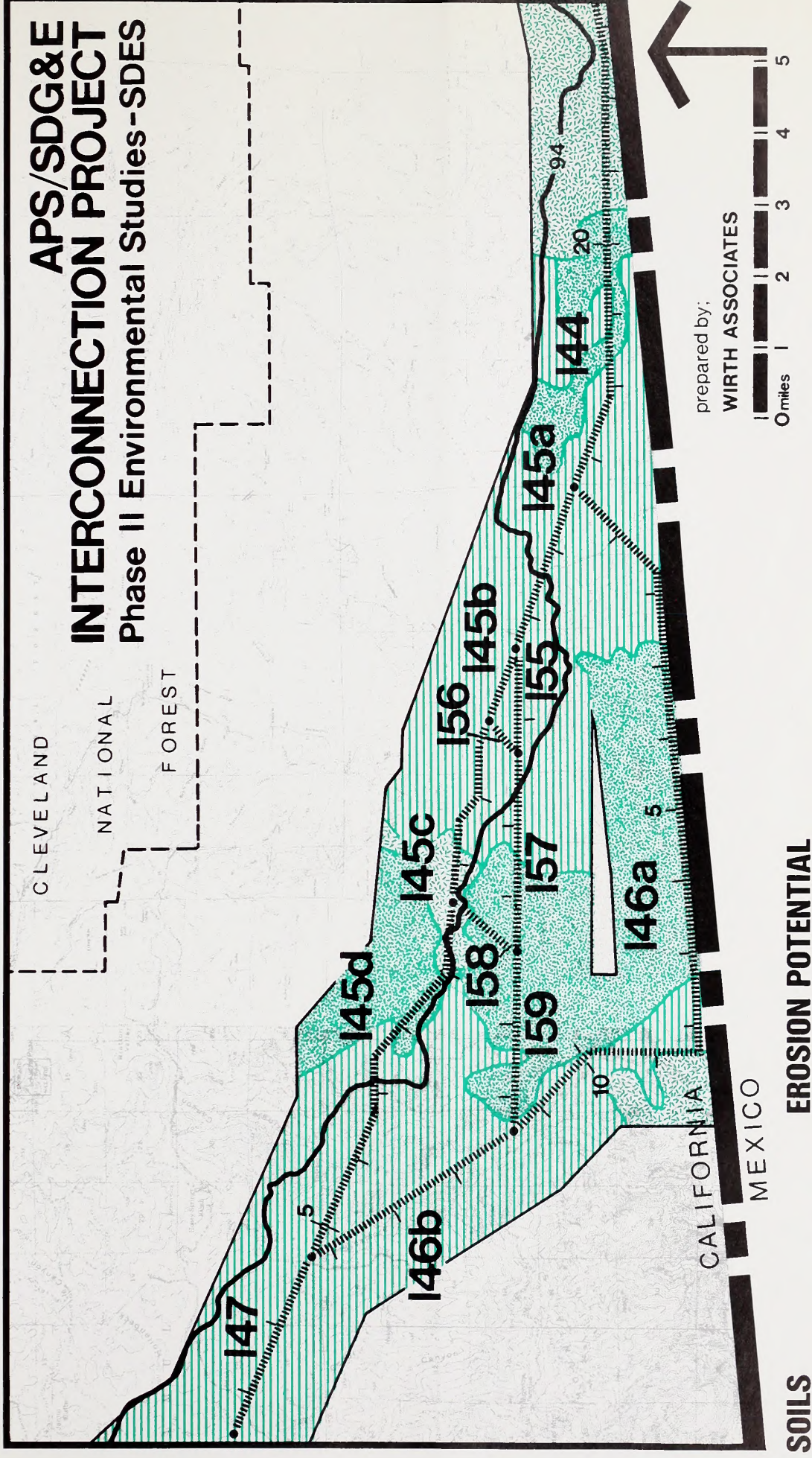
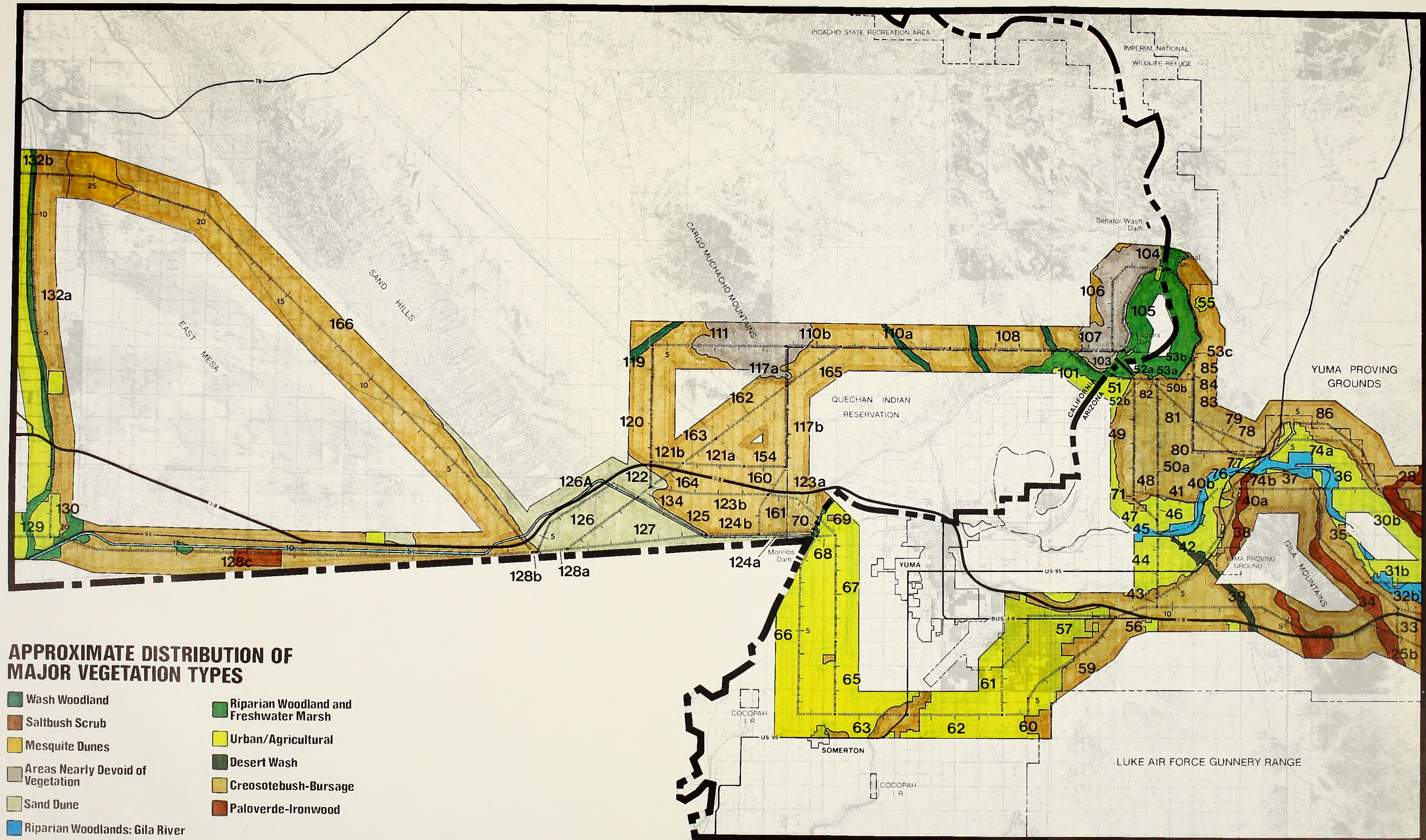


Figure 4-1(A)



APS/SDG&E INTERCONNECTION PROJECT Phase II Environmental Studies-SDES

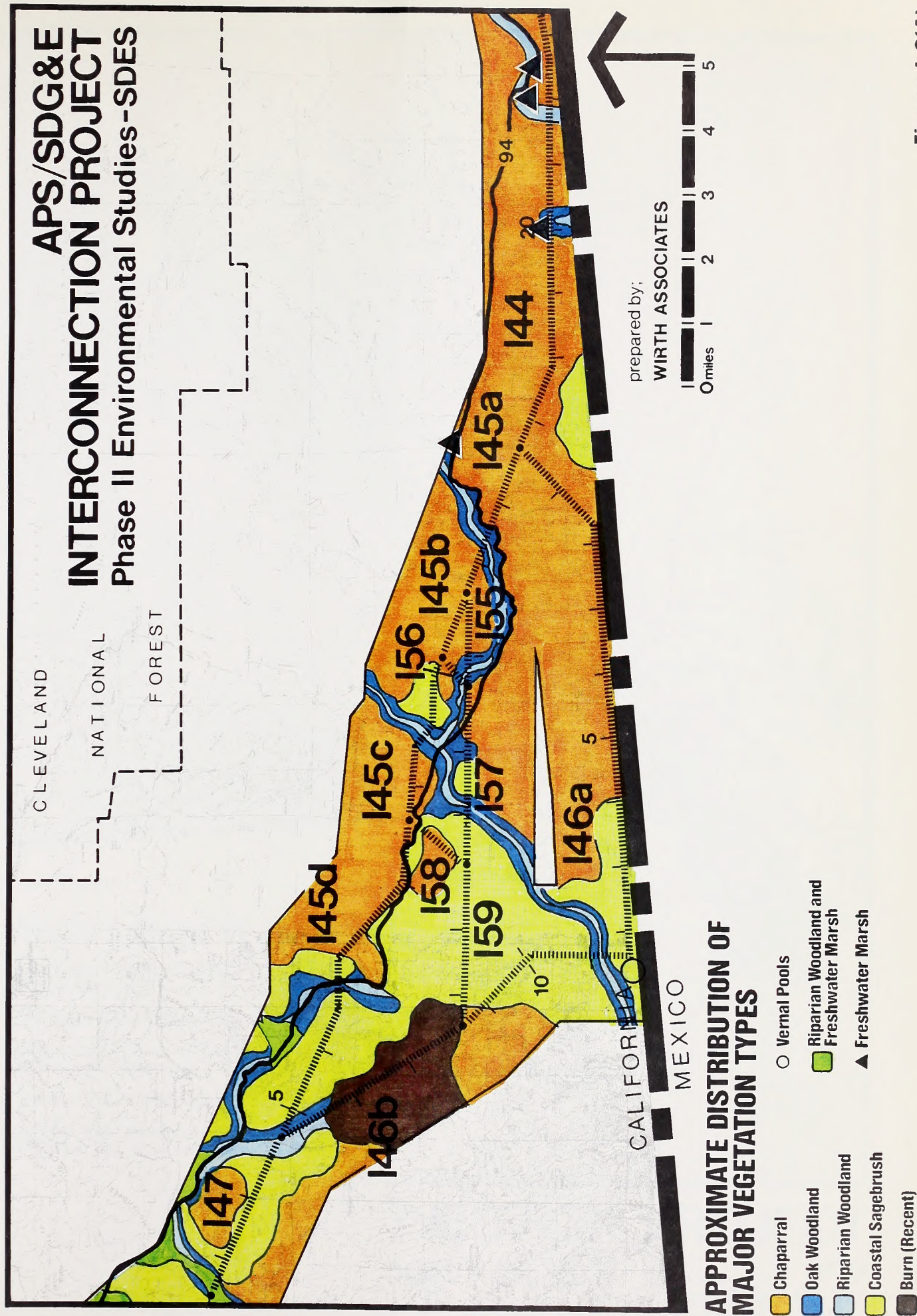
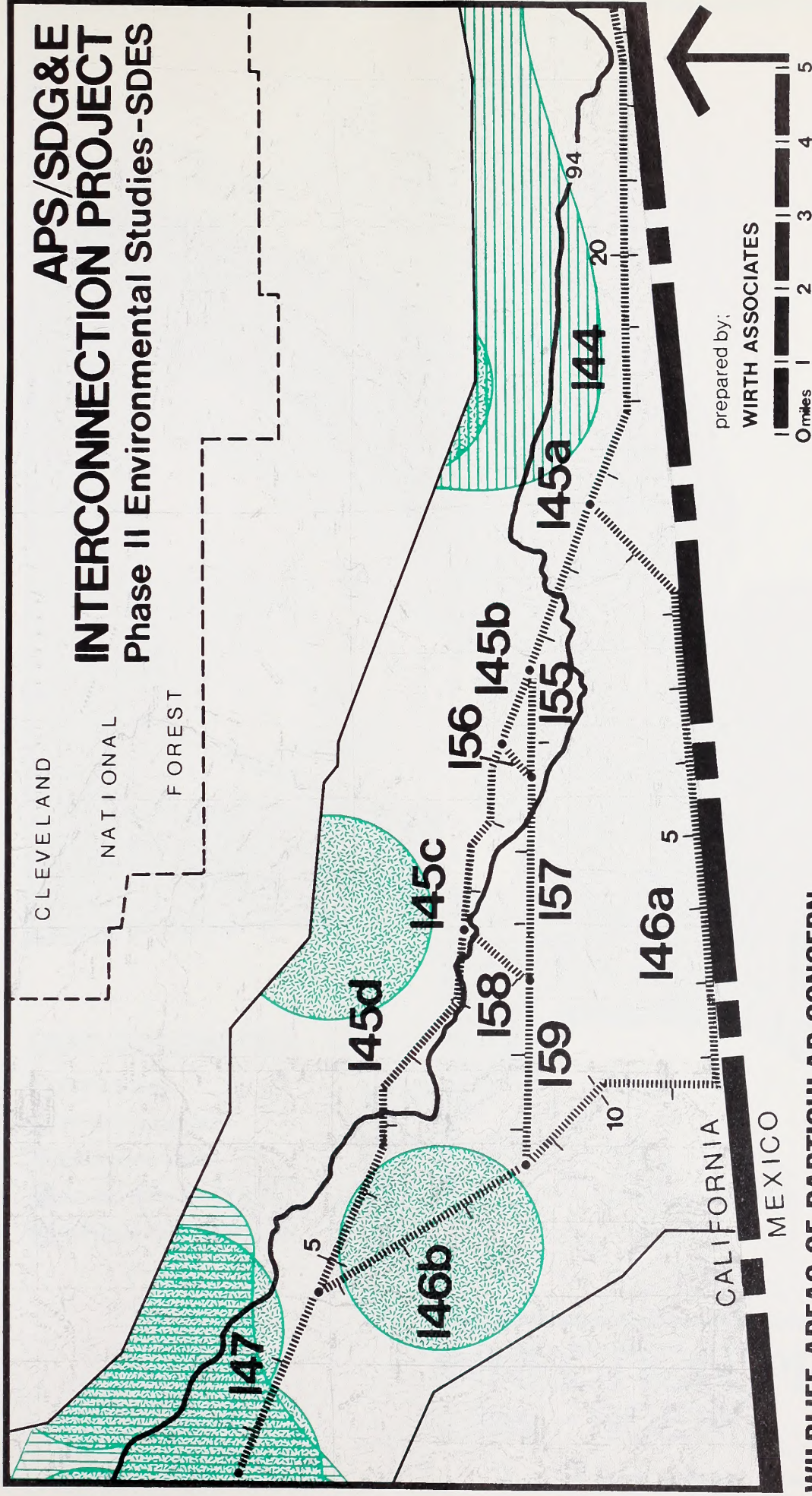


Figure 4-2(A)

APS/SDG&E INTERCONNECTION PROJECT Phase II Environmental Studies-SDES



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0 miles 1 2 3 4 5

WILDLIFE AREAS OF PARTICULAR CONCERN

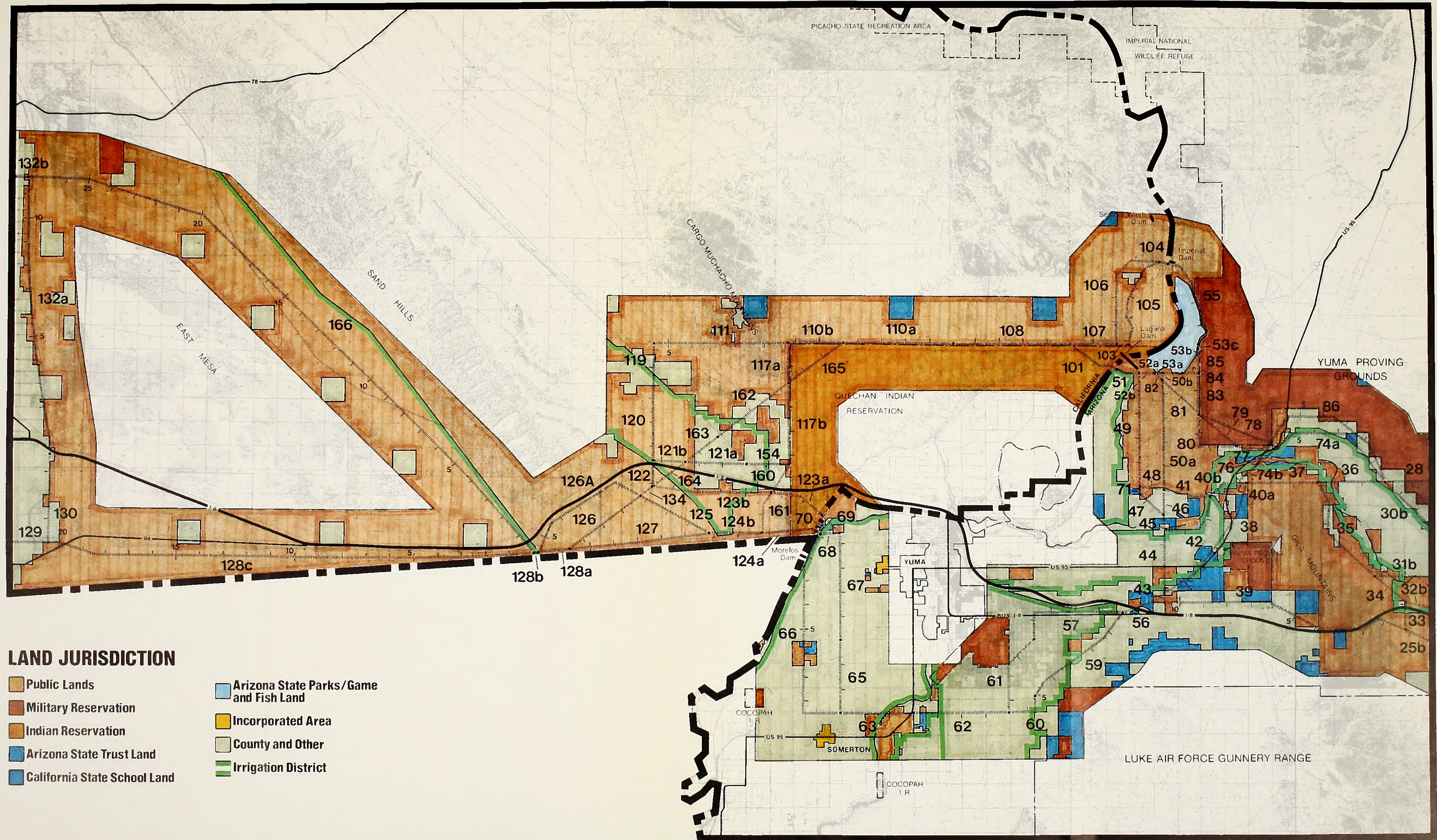
Raptor

Areas of Good Foraging and
Nesting Habitat (Incompletely
Censused)

Areas of High Nesting Density
or Prime Forage Areas
(Censused)

Known Breeding Areas

Figure 4-3(A)



APS/SDG&E INTERCONNECTION PROJECT Phase II Environmental Studies-SDES

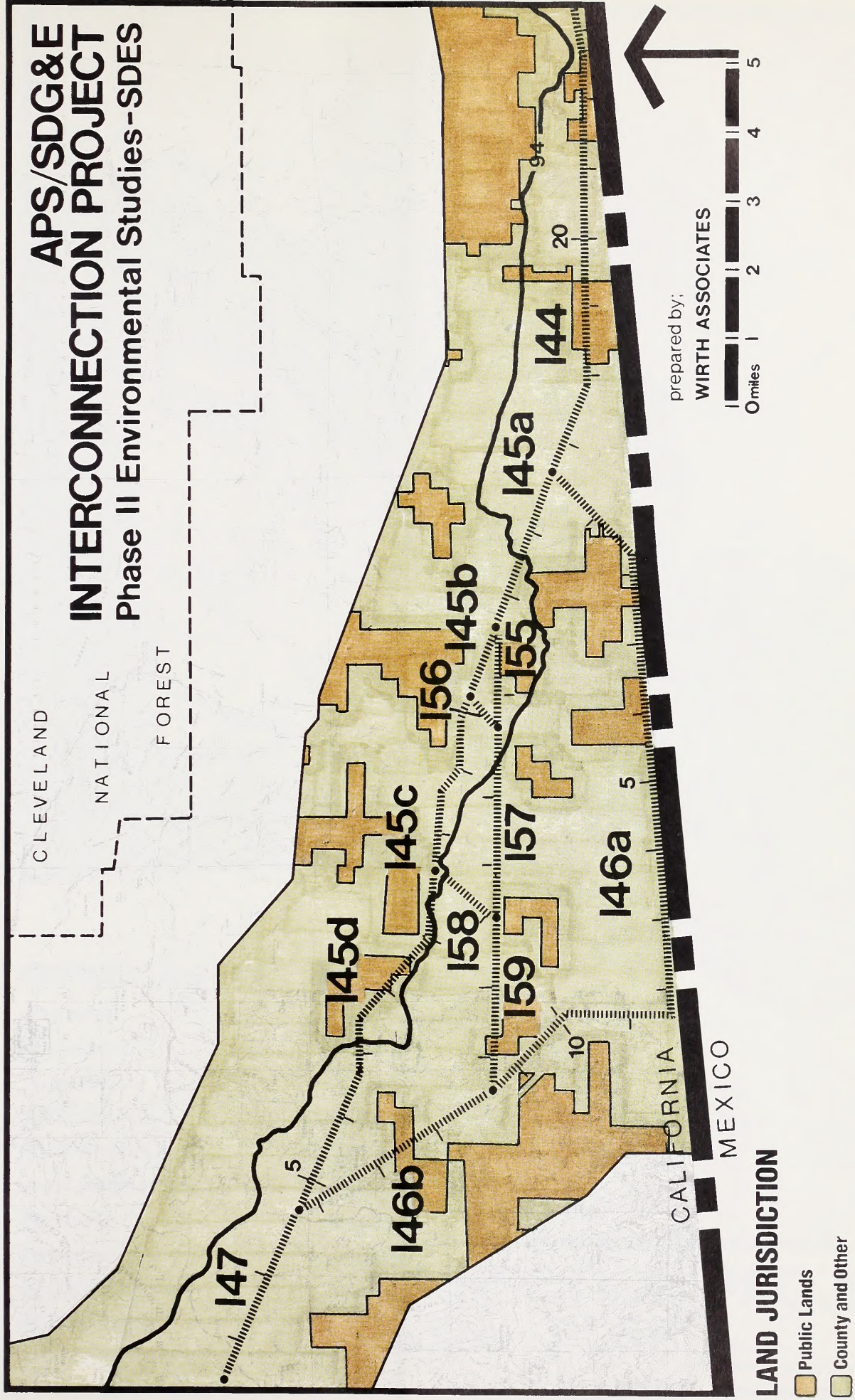
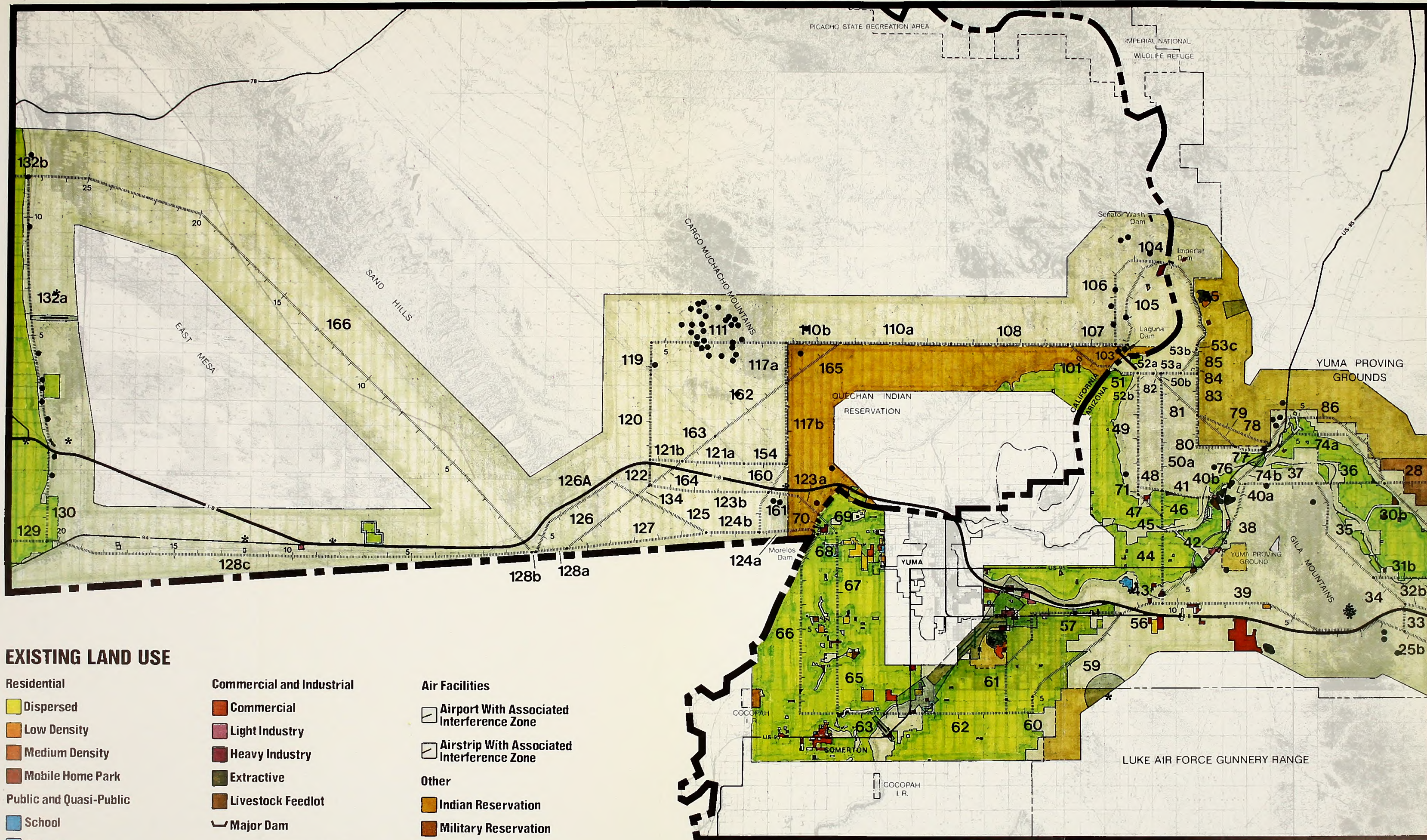


Figure 4-4(A)



EXISTING LAND USE

Residential

- Dispersed
- Low Density
- Medium Density
- Mobile Home Park

Public and Quasi-Public

- School
- Church
- Other Institutional
- Governmental

Commercial and Industrial

- Commercial
- Light Industry
- Heavy Industry
- Extractive
- Livestock Feedlot
- Agricultural Land
- Major Dam
- * Communication Facility

Air Facilities

- Airport With Associated Interference Zone
- Airstrip With Associated Interference Zone
- Indian Reservation
- Military Reservation
- Restricted Military
- Vacant Land

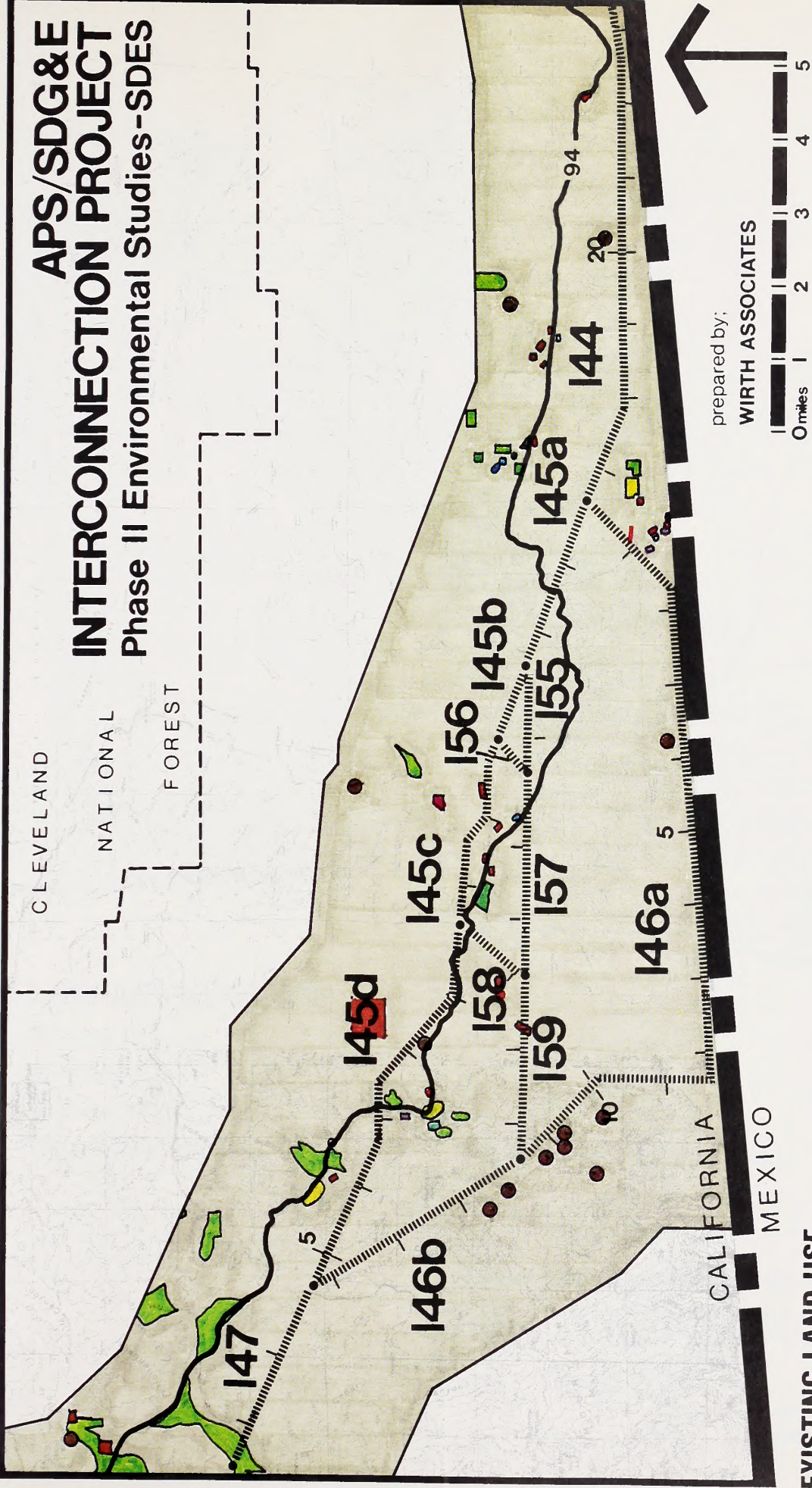
APS/SDG&E INTERCONNECTION PROJECT Phase II Environmental Studies - SDES

Figure 4-5(A)

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0 1 2 3 4 5 Miles

APS/SDG&E INTERCONNECTION PROJECT Phase II Environmental Studies-SDES

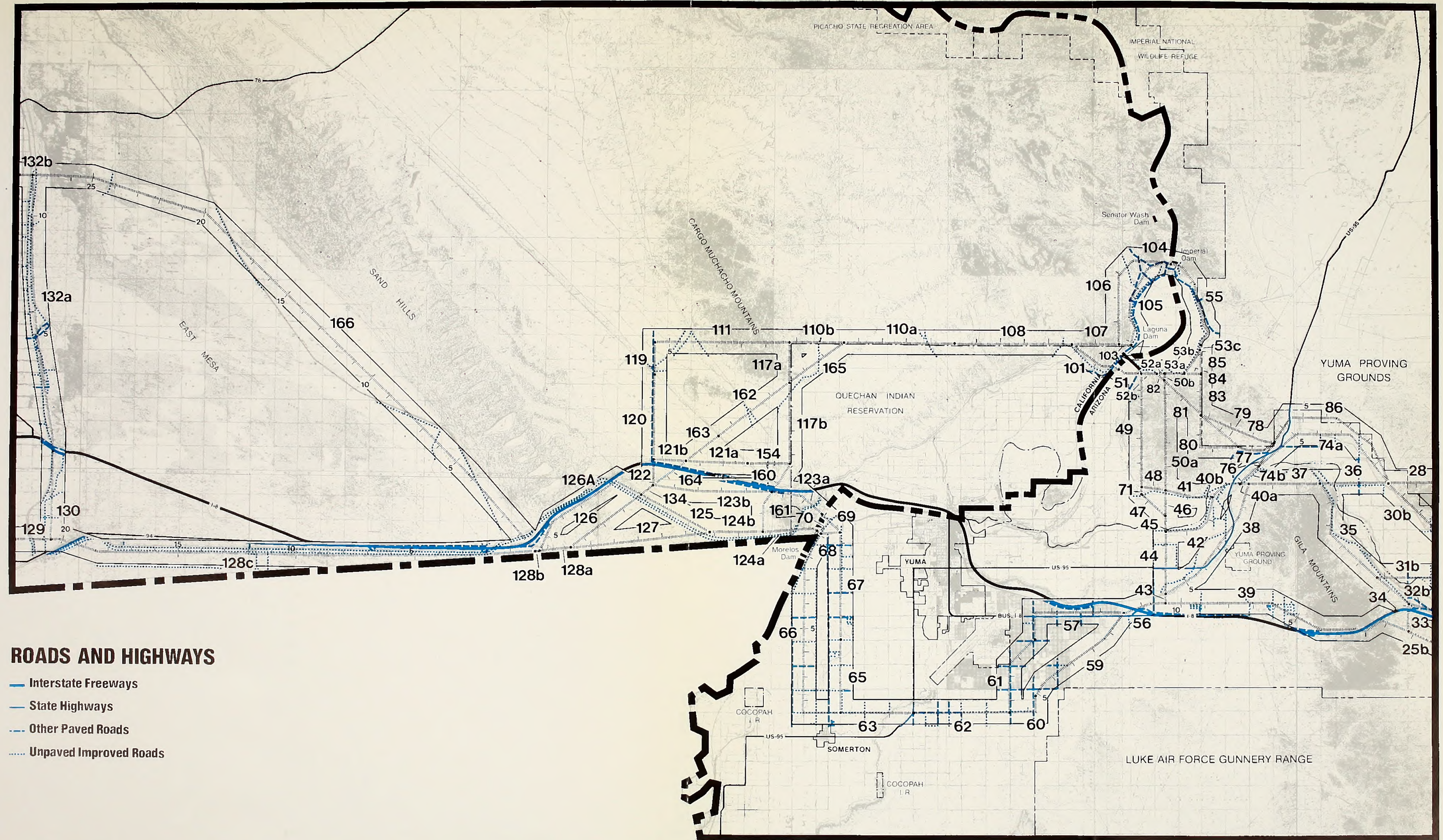


EXISTING LAND USE

- Residential
 - Dispersed
 - Mobile Home Park
 - Public and Quasi-Public
 - School
 - Church
- Other Institutional
 - Cemetery
 - Governmental
 - Commercial and Industrial
 - Commercial
 - Light Industry
- Extractive
 - Equestrian
 - Livestock Feedlot
 - Agricultural Land
- Air Facilities
 - Airstrip
 - Other
 - Vacant Land

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0 miles 1 2 3 4 5

Figure 4-5(A)



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Figure 4-6(A)

APS/SDG&E INTERCONNECTION PROJECT Phase II Environmental Studies-SDES

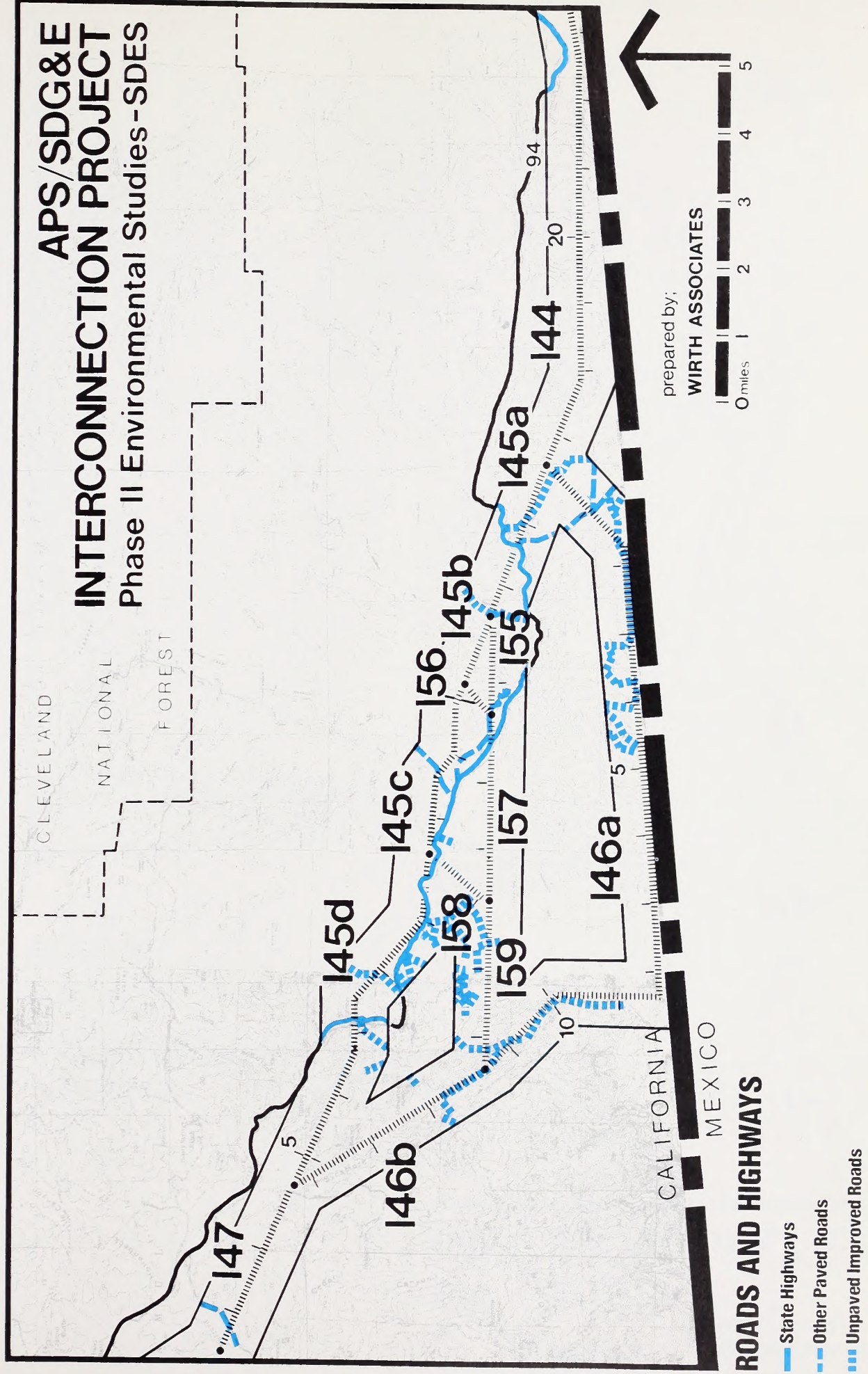
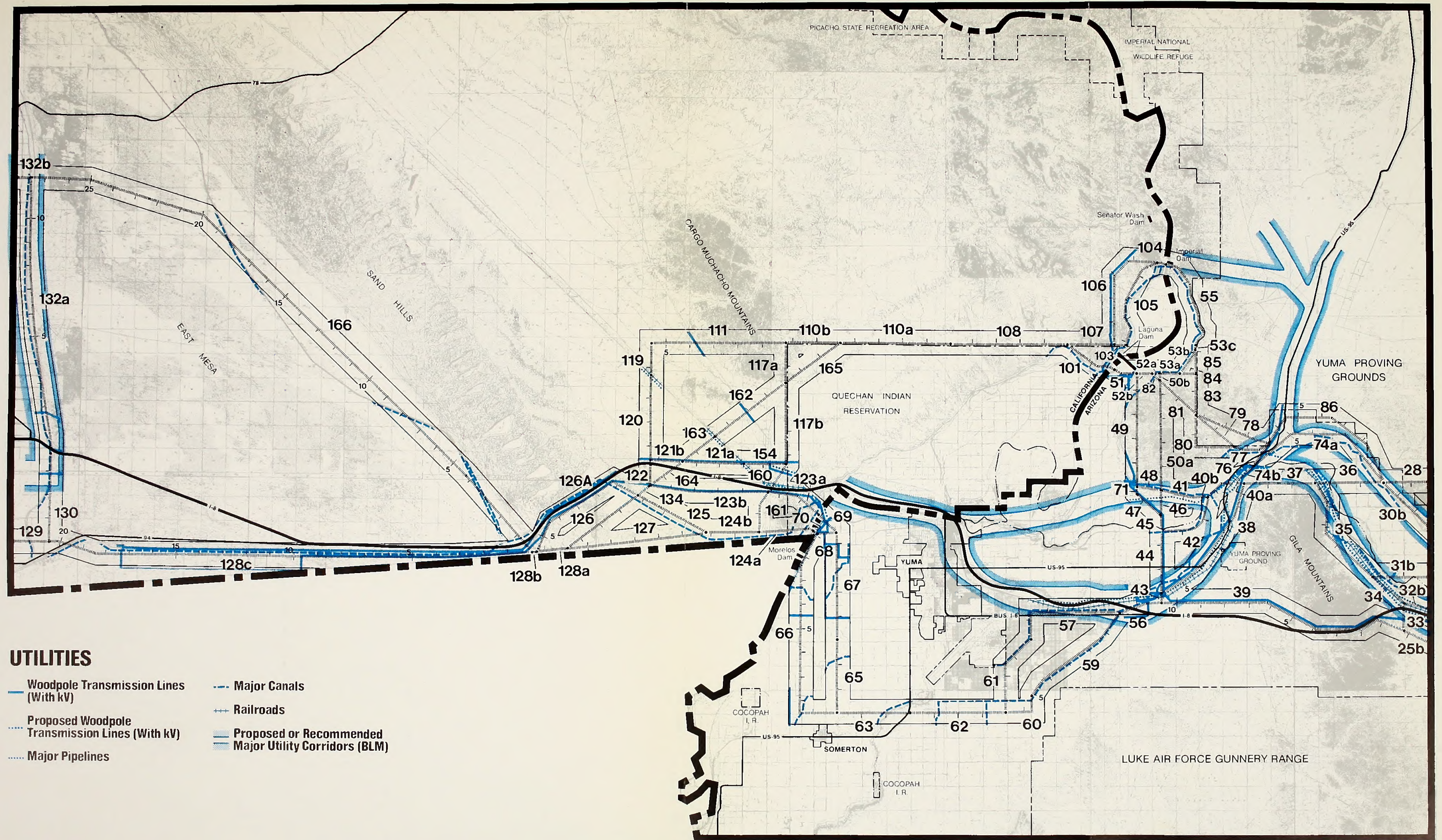


Figure 4-6(A)



APS/SDG&E INTERCONNECTION PROJECT **Phase II Environmental Studies - SDES**

Figure 4-7(A)

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0 1 2 3 4 5 Miles

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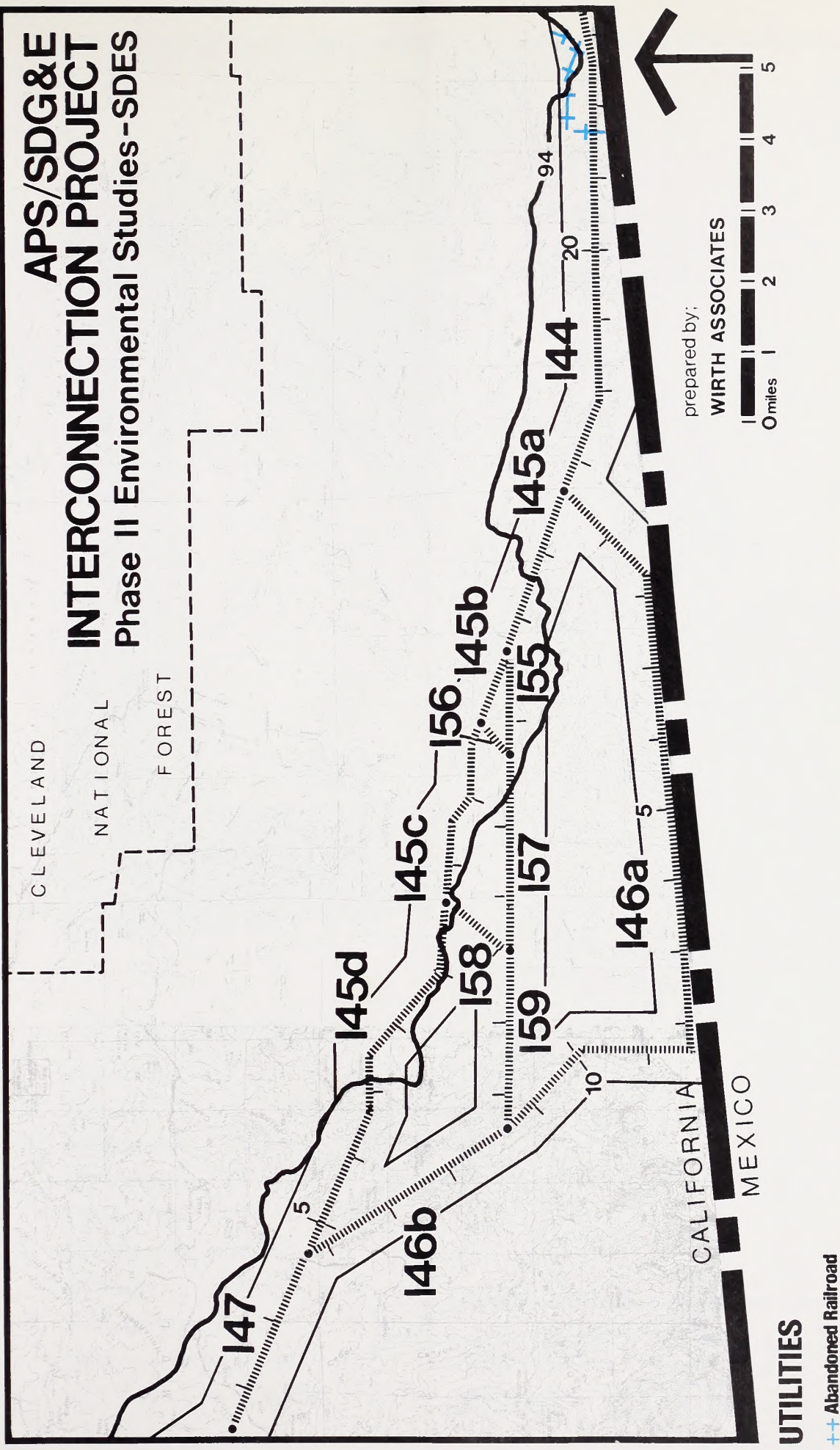
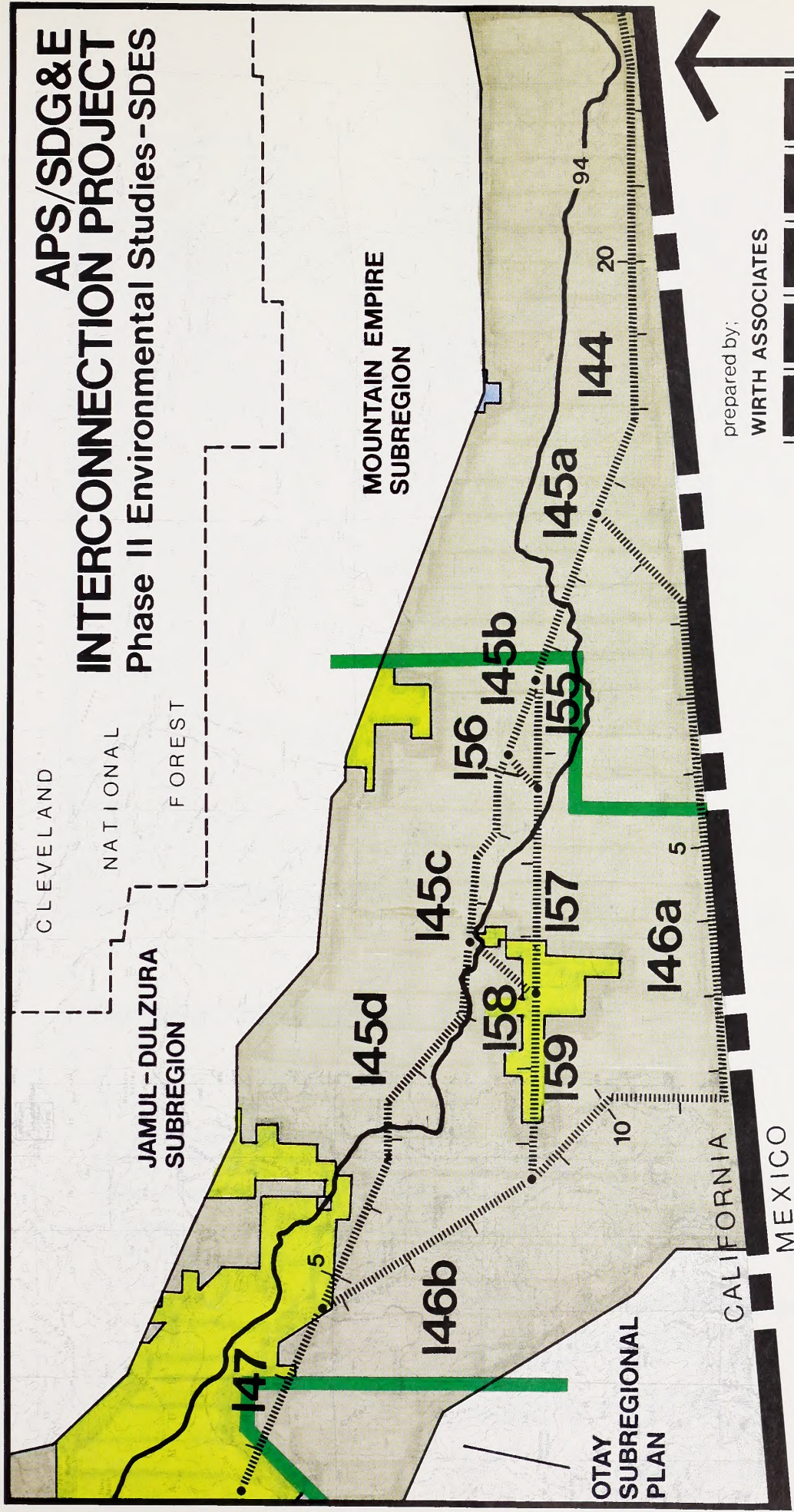


Figure 4-7(A)



FUTURE LAND USE

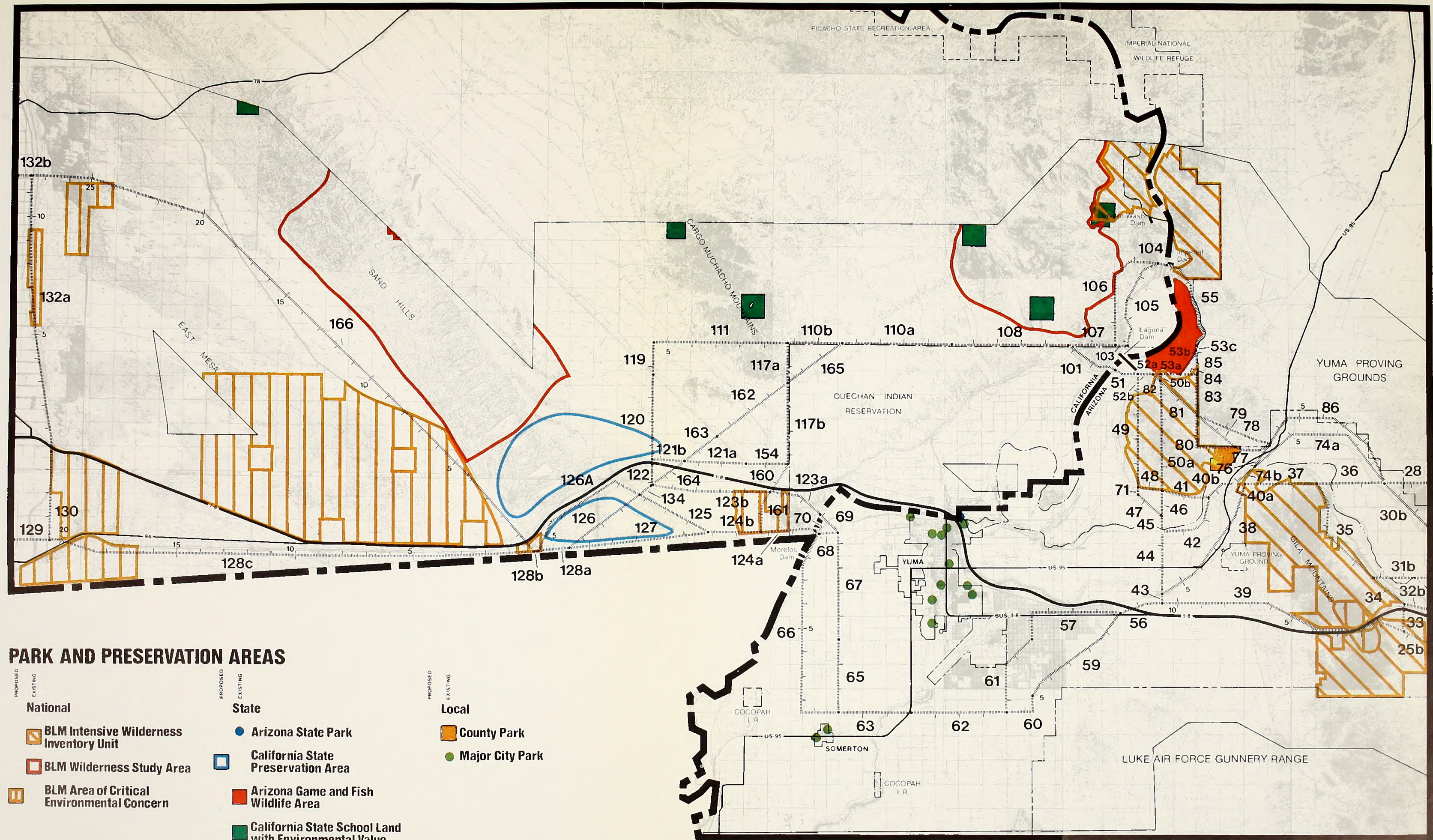
General Plans

Public and Quasi-Public

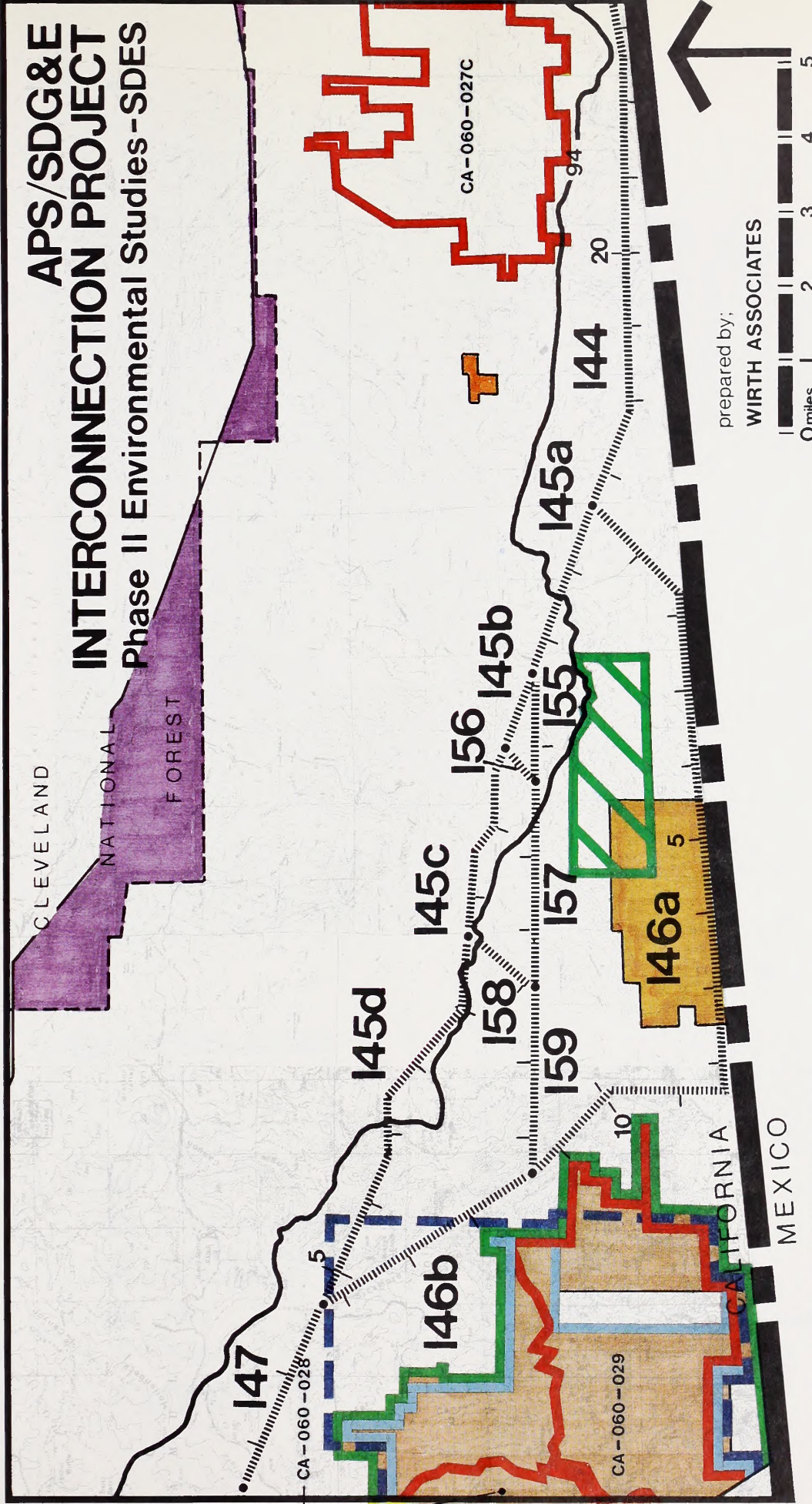
Agriculture

Open Space and Recreation

Figure 4-8(A)



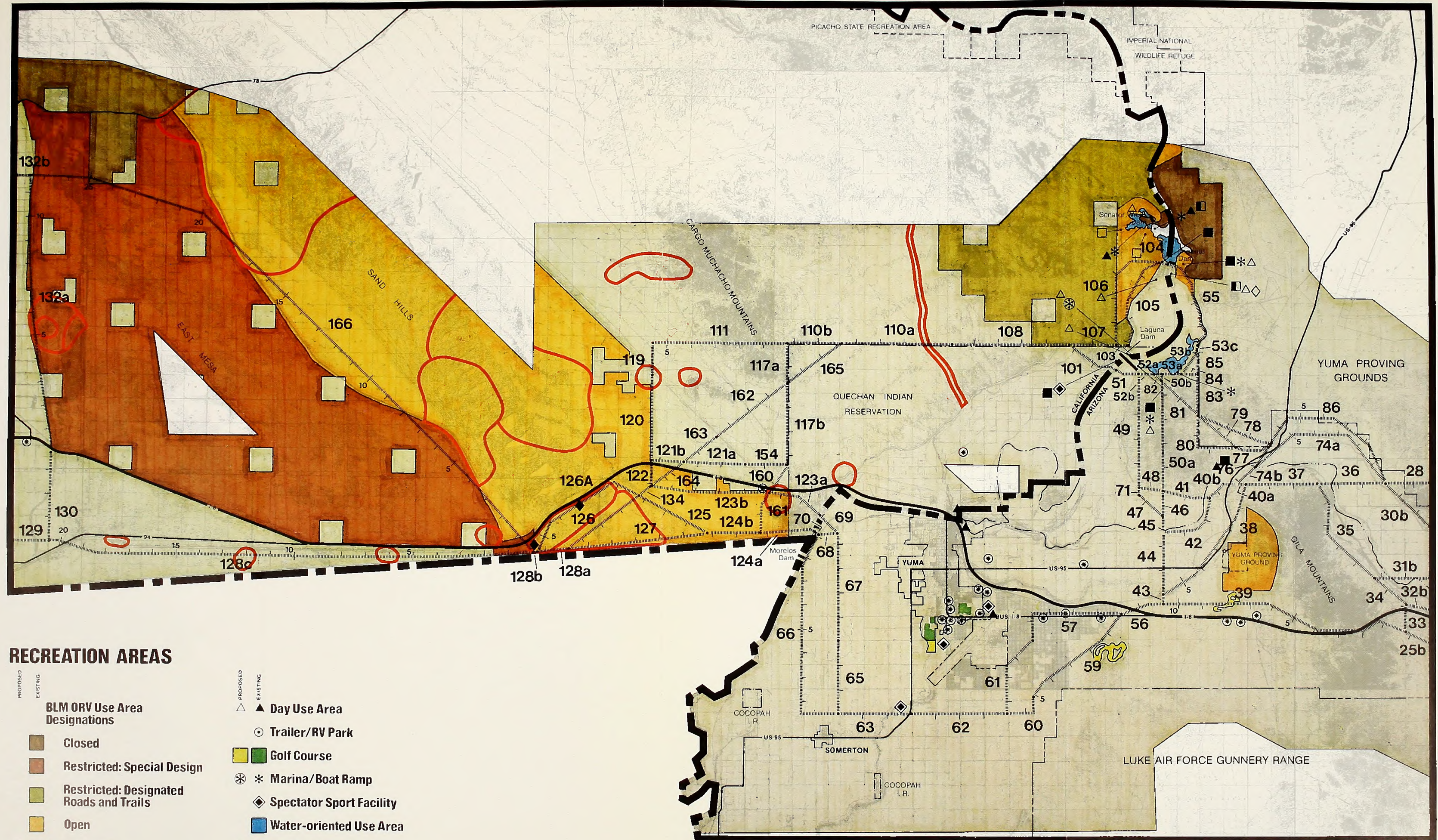
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PARK AND PRESERVATION AREAS



Figure 4-9(A)



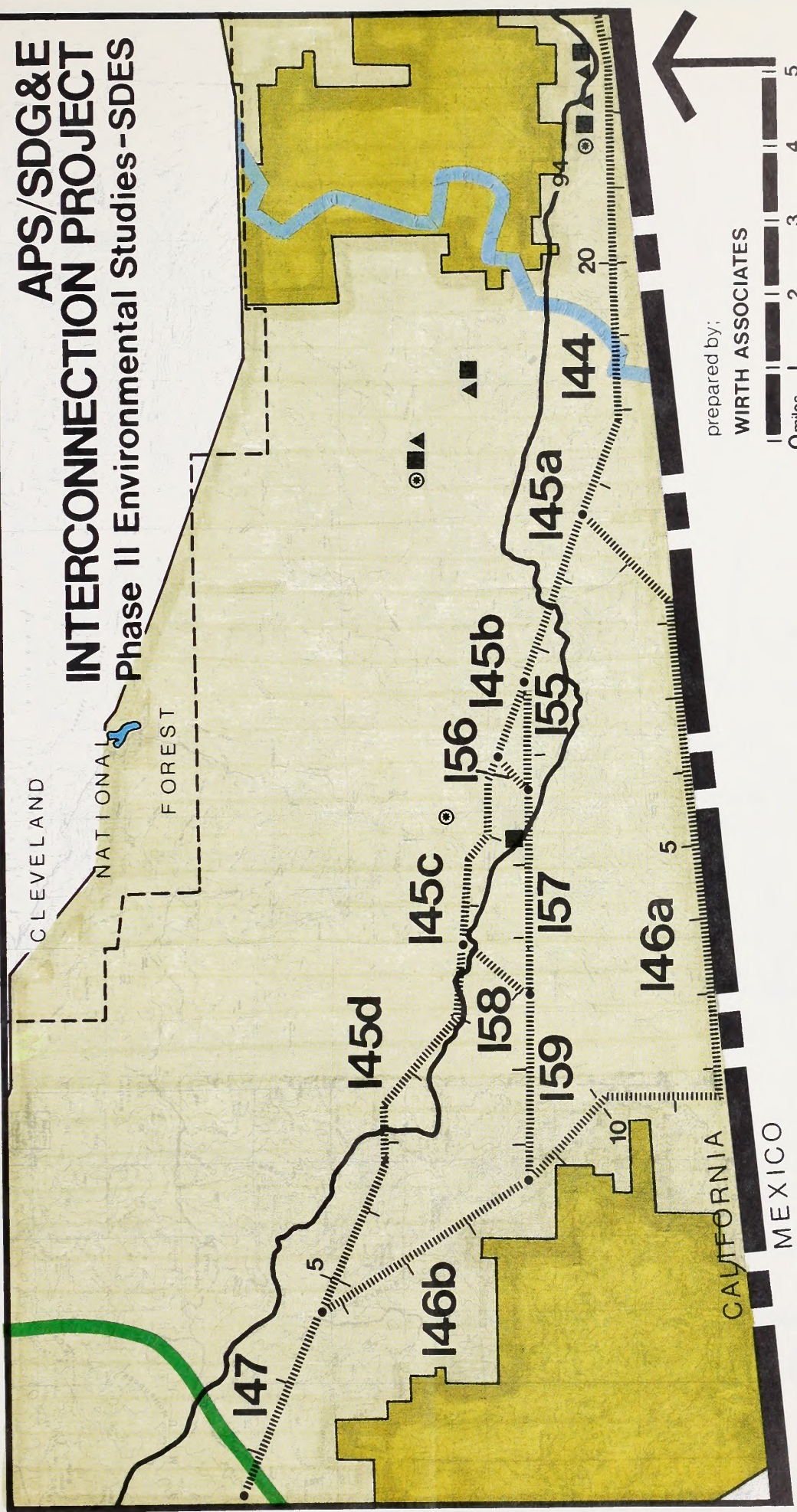
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Figure 4-10(A)

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0 1 2 3 4 5 Miles

APS/SDG&E INTERCONNECTION PROJECT Phase II Environmental Studies-SDES



prepared by;

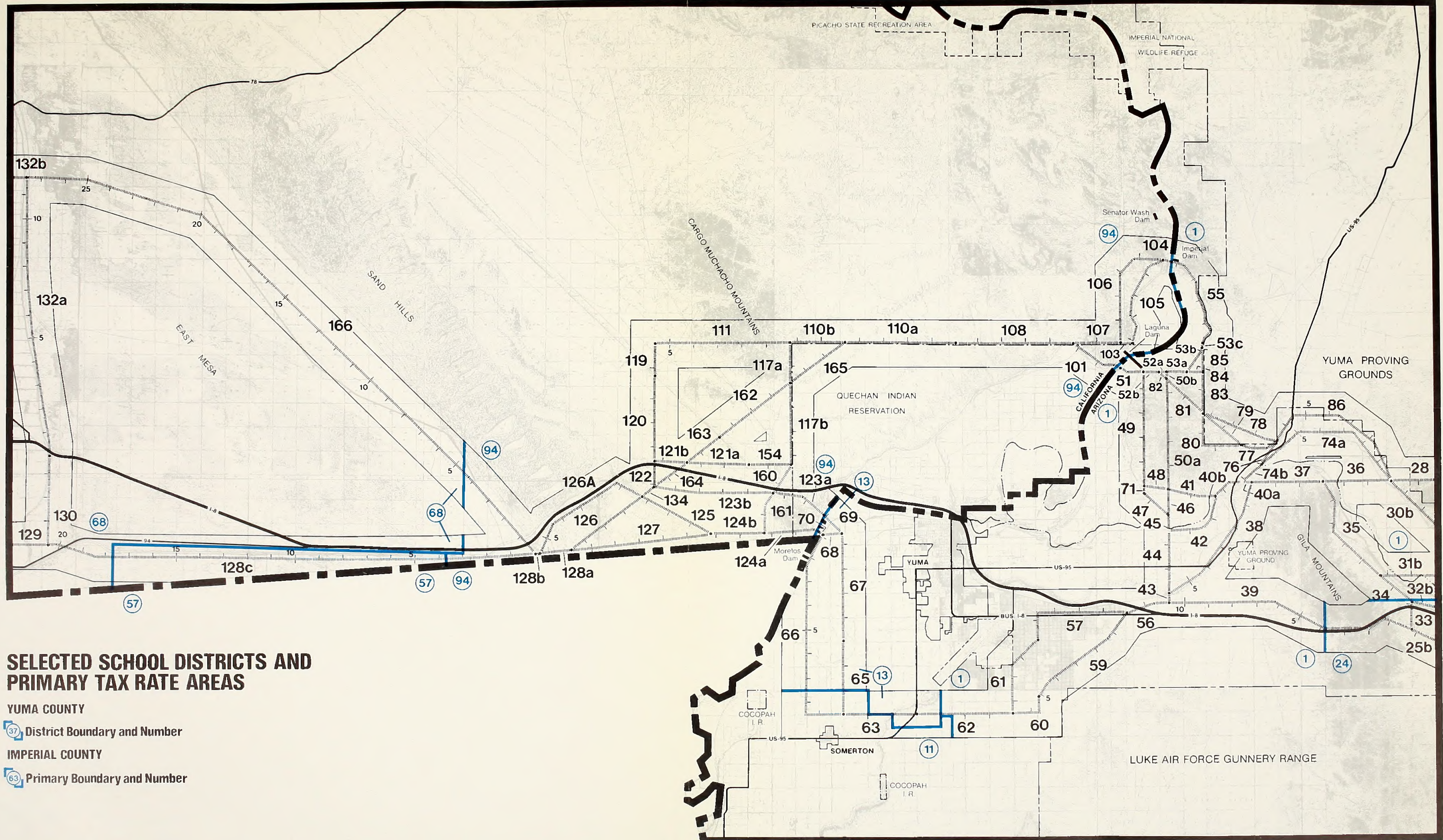
WIRTH ASSOCIATES



RECREATION AREAS

- | | | | |
|------------|---|-----------------------|-------------------------|
| EXISTING | BLM ORV Use Area Designations | PROPOSED | Hiking and Riding Trail |
| Yellow box | Restricted: Designated Roads and Trails | Green line | Trail |
| Blue line | National Scenic Trail | Black square | Campground |
| Blue box | Water-oriented Use Area | Black triangle | Day Use Area |
| | | Black circle with dot | Trailer/RV Park |

Figure 4-10(A)



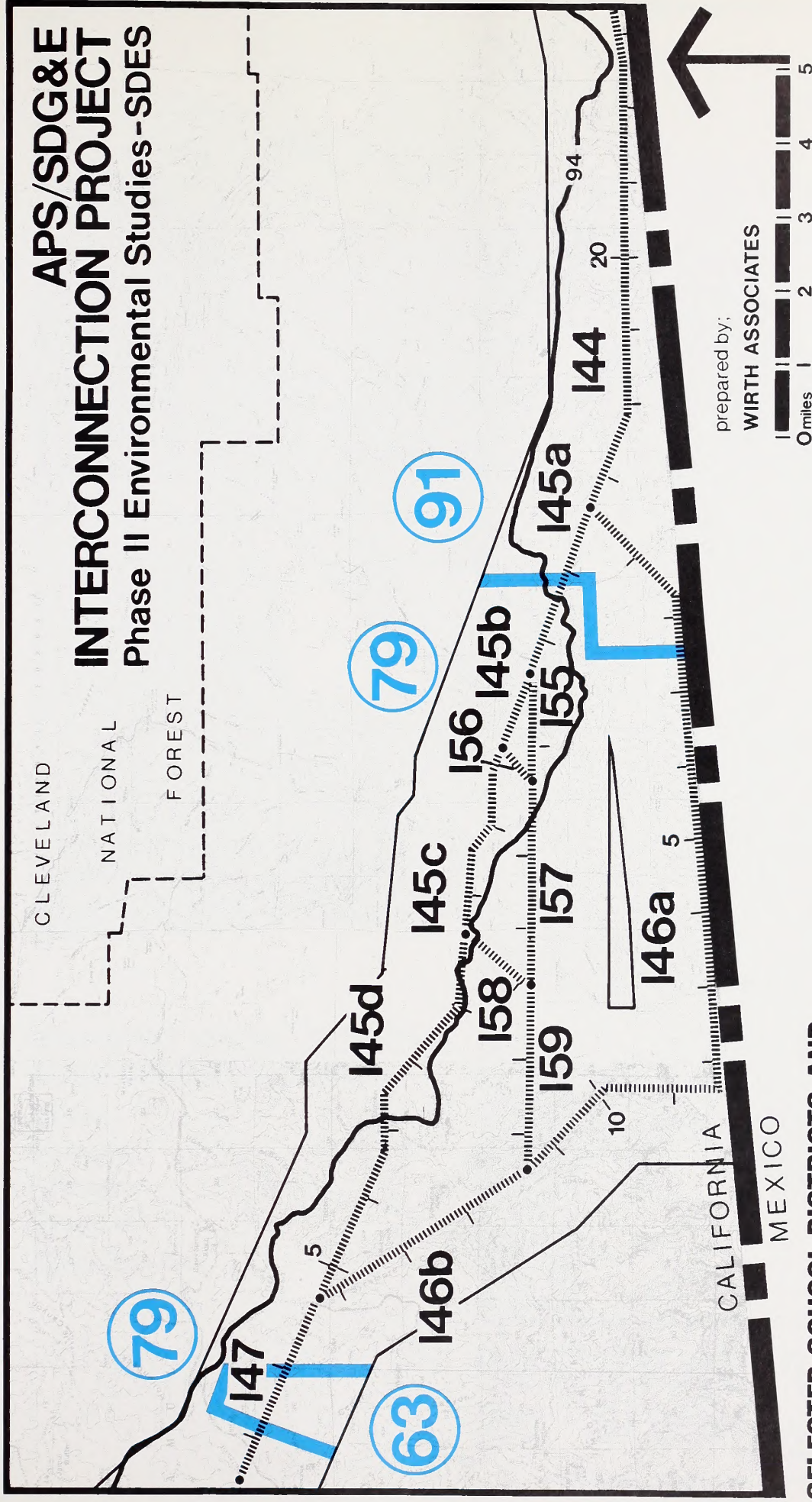
APS/SDG&E INTERCONNECTION PROJECT **Phase II Environmental Studies - SDES**

Figure 4-11(A)

prepared by
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0 1 2 3 4 5 Miles

APS/SDG&E INTERCONNECTION PROJECT Phase II Environmental Studies-SDES

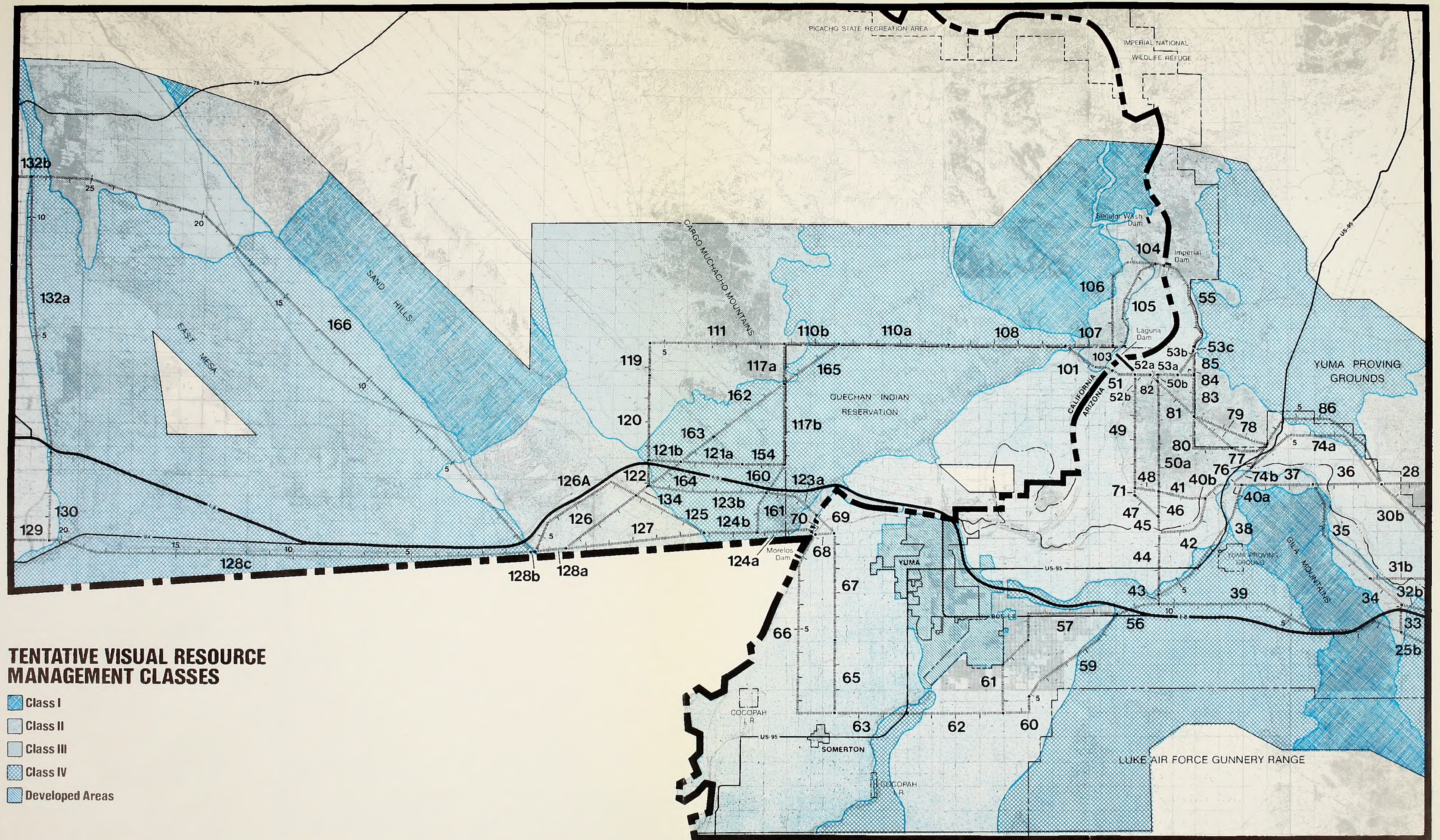


**SELECTED SCHOOL DISTRICTS AND
PRIMARY TAX RATE AREAS**

SAN DIEGO AND IMPERIAL COUNTIES

Primary Boundary and Number

Figure 4-11(A)



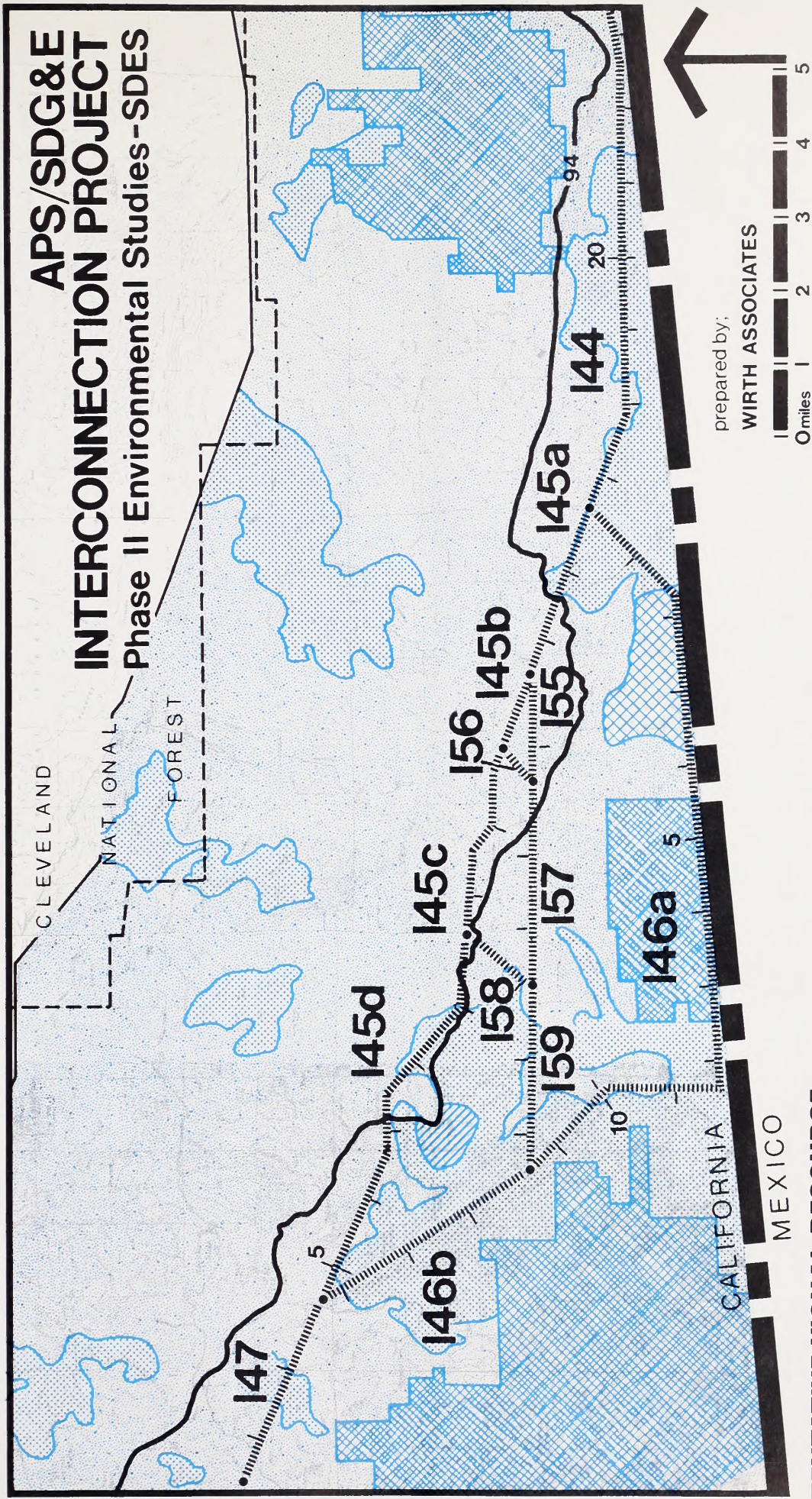
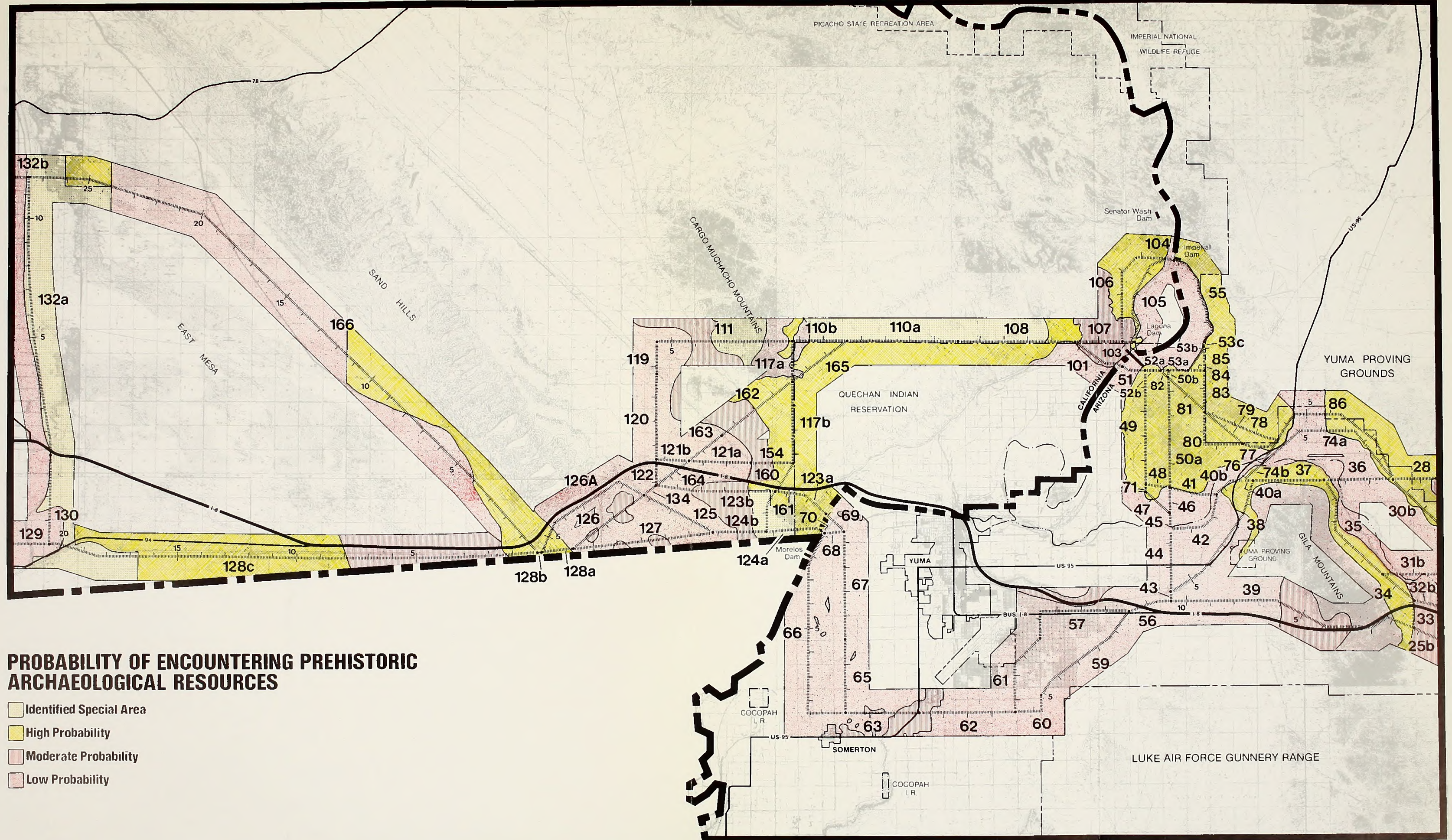


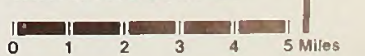
Figure 4-12(A)



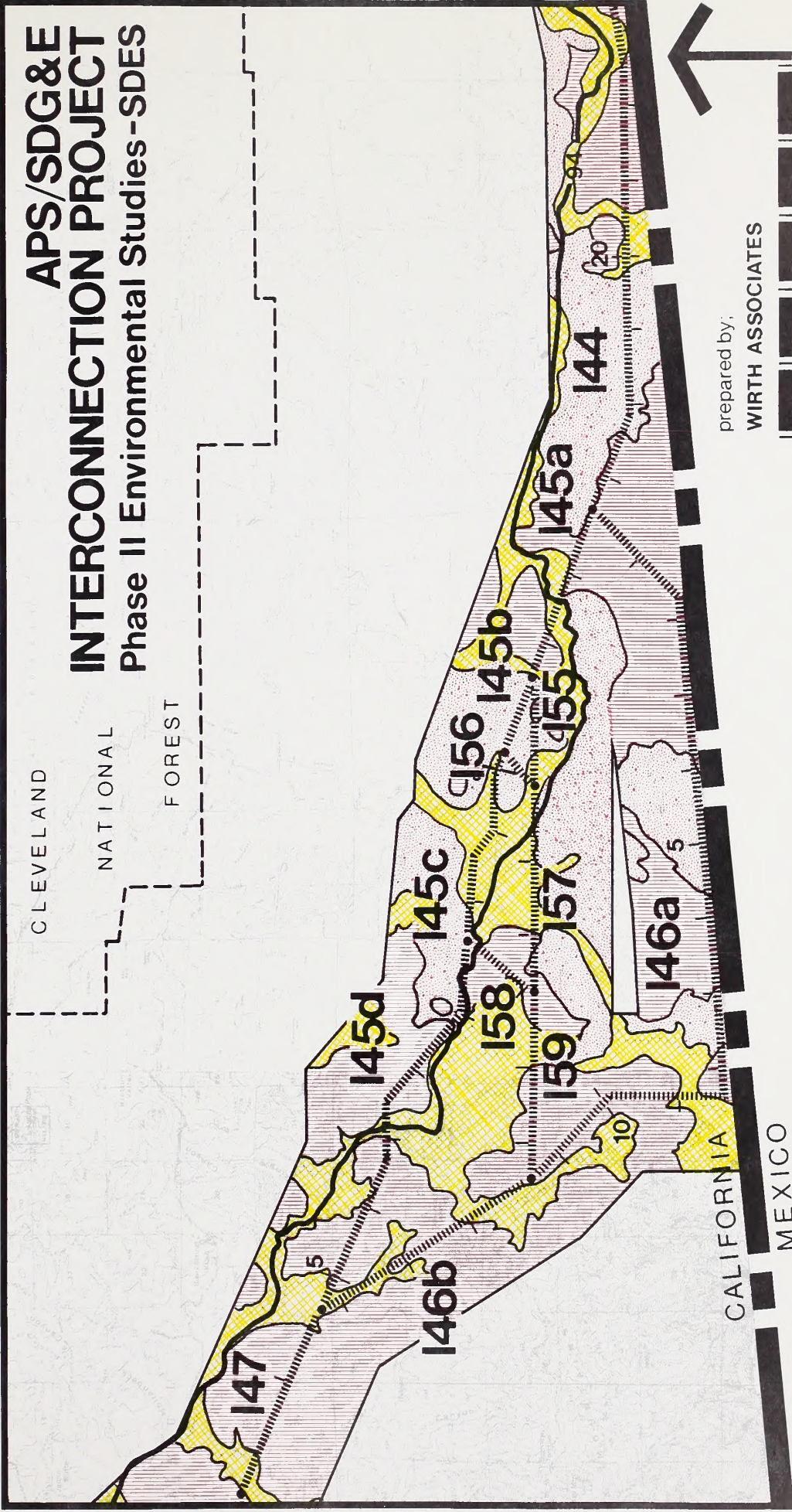
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Figure 4-13(A)

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PROBABILITY OF ENCOUNTERING PREHISTORIC ARCHAEOLOGICAL RESOURCES

- Identified Special Area
- High Probability
- Moderate Probability
- Low Probability

prepared by:
WIRTH ASSOCIATES
0 miles 1 2 3 4 5



ENVIRONMENTAL CONSEQUENCES

CHAPTER 5 - ENVIRONMENTAL CONSEQUENCES

N.B. This chapter is a supplement to Chapter 5 in the DES.

IMPACT ASSESSMENT/MITIGATION PLANNING PROCESS (IA/MPP)

Environmental consequences from the proposed action and alternatives are the residual impacts derived through a process that first identified, and subsequently evaluated and integrated, initial (unmitigated) impacts and appropriate mitigating measures.

The process involved assessing impacts based upon a comparison of the proposed Project with the pre-Project environment, determining mitigation that would effectively reduce or eliminate impacts and identifying "residual" impacts, or impacts remaining after the application of committed mitigation. The impact assessment and mitigation planning process is briefly described below. Reference should be made to Figure 5-1 in the DES when reviewing this section.

The initial step in the IA/MPP was to define the proposed action or "impacting agent," which collectively involved three individual but interrelated components or data sets. The first data set described the Applicant's proposed Project design features, construction techniques, operational characteristics and maintenance and abandonment procedures. (See Chapter 3.)

The second component involved data on where and to what extent new roads would have to be built or upgraded to construct and maintain the proposed Project facilities. The Applicants provided information for each routing alternative as to where existing access was sufficient, where existing roads would require upgrading and where new access roads would have to be constructed. (See Table 5-4(A) at the end of Chapter 5.)

The third data set was generically committed mitigation. Mitigation for the proposed Project includes two types of programs: generic and selective. Generic mitigation consists of measures or techniques to which the Applicants made commitment on a "generic" or nonspecific basis as part of their proposed Project plan. This level of mitigation was, accordingly, assumed in assessing impacts resulting from the proposed action. Generically committed mitigating measures are listed in Table 5-1. Selective mitigation consists of measures or techniques to which the Applicants and the Bureau of Land Management (BLM) made commitment on a case-by-case (or "selective") basis after impacts were identified and assessed.

Together, data encompassing (1) the Project description including the design, construction, operation, maintenance and abandonment of the proposed Project, (2) road access requirements and (3) generically committed mitigation constituted the definition of the proposed action.

The next set of data used in the IA/MPP was the inventory of the pre-Project environmental setting as described in Chapter 4. Collectively, these data define the natural, human and cultural environments potentially affected by the proposed action.

Types of impacts were first identified by considering what effects activities associated with the proposed action could have on the pre-Project environment associated with each alternative route. Impact zones within alternative routes were defined as one-half-mile wide, and were delineated from a preliminary centerline identified by the Applicants on the assumption that the final right-of-way would lie within the half-mile zone.

Following identification of types of impacts, potential impacts were determined, assessed and documented according to location of impact, type of impact and level of impact. The impact location was recorded by link number and milepost and the impacted area described. The impact type was recorded to correspond to the predetermined list of significant impact types relevant to each resource. The impact level was assessed and recorded both quantitatively and qualitatively. In order to determine impact levels, an "impact model" was developed for each resource classification. Each model was constructed from the same criteria:

- Resource Sensitivity, or the probable response of a particular resource to Project-related activities.
- Resource Quality, or the pre-Project condition of the resource potentially affected.
- Resource Quantity, or the amount of the resource potentially affected.
- Duration of Impact, or the period of time over which the resource would be affected, measured as short-term (up to a few years) or long-term (life of the Project and beyond).

Although the underlying criteria were conceptually the same for each model, characteristics of the criteria varied according to the characteristics of each resource.

Application of the models to each route yielded qualitative impact levels of high, moderate, low or not identifiable, as defined below.

High Impact - A high level of impact would result if the construction, operation, maintenance or abandonment of the proposed Project would potentially cause a significant or substantial adverse change to or stress an environmental resource or resources.

Moderate Impact - A moderate impact would result if the construction, operation, maintenance or abandonment of the proposed Project would potentially cause some adverse change to or stress (ranging between significant and insignificant) an environmental resource or resources.

TABLE 5-1
GENERICALLY COMMITTED MITIGATION

1. All construction vehicle movement outside the right-of-way will be restricted to predesignated roads.
2. The areal limits of construction activities will be predetermined, with activity restricted to and confined within those limits. No paint or permanent discoloring agents will be applied to rocks or vegetation to indicate survey or construction activity limits.
3. Blasting required for access roads or tower footings will not be done where debris cannot be recovered and removed from the site without further environmental impacts.
4. In construction areas where recontouring is not required, vegetation will be crushed wherever possible and original contour will be maintained to avoid excessive root damage and allow for resprouting.
5. In construction areas where recontouring is required, revegetation and/or reseeding will occur after the final grade has been established.
6. A replacement big-game watering facility will be constructed for each existing one disturbed by construction activities.
7. Towers and conductors will be marked with high-visibility devices where required by governmental agencies.
8. On agricultural land, right-of-way will be aligned with field boundaries to the greatest extent practicable and towers will be set near field boundaries, service roads, etc., to reduce the impact to farm operations and agricultural production. Where this is not possible because of irregular field boundaries, the towers will be set on or perpendicular to the crop rows wherever feasible, so that the transmission lines do not run diagonally to the crop rows.
9. Prior to construction, all supervisory construction personnel will be instructed on the protection of cultural and ecological resources. To assist in this effort the construction contract will address: (a) Federal and state laws regarding antiquities and plants and wildlife, including collection and removal; (b) the importance of these resources and the purpose and necessity of protecting them. Illustrations of protected resources that might occur in the area will be supplied in order to assist in identification.
10. A program for handling and resolving complaints will be established and will be administered by a designated person with a published telephone number. The program will work to resolve any complaints within the areas of construction activities, audible and radio noise, television interference

Table 5-1 (continued)
Generically Committed Mitigation

and electrical (including electromagnetic and electrostatic) influence on any equipment, instruments and appliances. Questions involving the health and safety of humans and animals in the affected areas will also be responded to by means of this program.

11. Preconstruction Cultural-Resource Studies

Following identification of the preferred route, the Applicants will conduct intensive cultural-resource surveys by an appropriately qualified professional to identify specific properties subject to impact from the construction, operation and maintenance of the proposed Project. The cultural-resource surveys will include historical, ethnographic, architectural and archaeological elements.

- A. The historical element will include, but not be limited to, development of narrative history of the study area. The purpose of the narrative history will be to provide a framework in which to evaluate individual historic properties.
- B. The ethnographic elements will include, but not be limited to, the identification of general and/or specific heritage or ethnic concerns. The purpose of the ethnographic study will be to provide a framework in which to evaluate the concerns of local Native Americans for historic and prehistoric properties in the study area and to assess the effect that the proposed action will have.
- C. The architectural element of the cultural resource study will focus on, but may not be limited to, the identification of properties within the study area that may be of architectural importance.
- D. The archaeological element will include, but will not be limited to, identification and evaluation of prehistoric archaeological resources, within the study area. The archaeological study will compile sufficient background information on the prehistory of the study area in order to assess and/or provide a framework in which to evaluate individual prehistoric properties.
- E. An intensive archaeological survey will be conducted within the survey study area. The purpose of the survey will be to identify specific properties within the survey study-area that may have cultural resource values. The survey study-area will include, but will not be limited to, the proposed right-of-way, access roads and any other areas that will be disturbed by the construction and/or operation of the proposed transmission line. The survey study-area will be established and agreed upon by the Applicants (APS and SDG&E) and the agencies (BLM and

Table 5-1 (continued)
Generically Committed Mitigation

- state review agencies) in consultation with the State Historic Preservation Officer (SHPO) or his/her designated representative within each state.
- F. Following identification of the cultural resources within the survey study-area, a preliminary report(s) will be prepared and maps with site locations will be compiled. The preliminary report will include a brief description and evaluation of the cultural resources located within the survey study-area and recommendations for avoidance. The preliminary report and maps will be submitted to the Applicants' transmission line engineers. The site information will be used in siting and designing towers, access roads and other construction areas to avoid, to the extent possible, the cultural resources along the route.
 - G. A report or separate section of a report(s) will be prepared for each element. Each report will include, but will not be limited to, a description of background research and evaluation of existing data, a description of field inspection methods, a substantive assessment of the results of the survey, recommendations of testing or further analysis and an evaluation of the significance of each property.
 - H. A preservation plan will be prepared. The plan will address all four elements - archaeology, history, ethnology and architecture. The preservation plan will include, but not be limited to, the following: (a) identification of those cultural-resource properties that are not considered to be eligible for the inclusion in the National Register of Historic Places and the rationale for such an evaluation, (b) identification of those cultural-resource properties that are considered to be eligible for inclusion in the National Register of Historic Places and the rationale of such an evaluation, (c) a detailed description of the type and degree of impact the proposed Project will have with regard to those properties identified above, (d) recommendations for mitigating any adverse effects that are expected to occur, (e) recommendations for general protective procedures to be followed during construction, maintenance and operation of the proposed transmission line.
 - I. BLM will consult with the SHPO and Advisory Council on Historic Preservation (ACHP), and will follow the procedures prescribed in 36 CFR 800.4 and 36 CFR 1204 regarding determination of eligibility, determination of effect, and identification of measures which will avoid or mitigate any adverse effects.
 - J. The Applicants will satisfactorily avoid or mitigate the adverse effects to cultural resources resulting from the proposed Project in accordance with measures agreed upon among BLM, SHPO and ACHP.

Table 5-1 (continued)
Generically Committed Mitigation

12. The Applicants will apply necessary mitigation to satisfy complaints of line-generated radio or television interference.
13. The Applicants will apply necessary mitigation to eliminate problems of induced voltages onto conductive objects sharing a right-of-way, to the mutual satisfaction of the parties involved.
14. The Applicants will continue to monitor studies performed to determine the effects of audible noise and electrostatic and electromagnetic fields in order to ascertain whether these effects are significant.

Low Impact - A low impact would result if the construction, operation, maintenance or abandonment of the proposed Project would potentially cause an insignificant or small adverse change or stress to an environmental resource or resources.

No Identifiable Impact - No identifiable impact would be indicated where no measurable impact would occur to the specific resource(s) under investigation.

A mitigation assessment was conducted to determine requirements for mitigation. In some cases where impacts were low, or mitigation would not be effective, no mitigation was recommended. Where mitigation was warranted and would be effective, mitigation recommendations (from the selectively committed mitigation list in Table 5-2) were made by the resource specialists to reduce or eliminate specific impacts.

Based upon the application of the mitigation recommendations, impacts were reassessed and, where appropriate, impact levels reestablished. The preliminary residual impacts remaining after application of recommended mitigation indicated the effectiveness of a particular mitigation measure. The Applicants evaluated the cost and technical feasibility of each recommended mitigation measure, and made commitment to undertake specific mitigation in specific geographic locales on a case-by-case basis. Subsequently, the BLM reviewed the Applicants' proposed mitigation plan and in certain instances required additional mitigation on Federal lands. This selectively committed mitigation plan (Table 5-3A) along with the generic mitigation committed to as part of the Project plan constitute the mitigation program for the proposed Project. Subsequent assessment of the impacts remaining after selectively committed mitigation resulted in the final residual impacts that constitute the environmental consequences from the proposed action. Residual impacts are displayed on Table 5-4(A).

Specific mitigation recommendations/commitments for cultural resources are not being made at this time, as a more detailed data-base for determining appropriate and effective mitigation will be available following the completion of the committed preconstruction (Phase III) cultural-resources studies. Mitigation will be developed in consultation with the state historic preservation offices.

TABLE 5-2
SELECTIVELY COMMITTED MITIGATION

1. The alignment of any new access road will follow the area's landform contours, providing that such alignment does not additionally impact resource values, and that such alignment will be subject to review and approval of the landowner. This would minimize ground disturbance and/or reduce scarring (visual contrast).
2. All access roads will be permanently closed using the most effective and least environmentally damaging methods appropriate to that area with the concurrence of the landowner. This would limit new or improved accessibility to the area.
3. Special tower design will be utilized; e.g., shorter, taller, tubular steel, H-frame. This would minimize ground disturbance, operational conflicts, visual contrast and/or avian conflicts.
4. Conductors will be constructed of nonspecular material. This would reduce visual contrast.
5. Towers will be placed so as to avoid sensitive features and/or to allow conductors to clearly span the feature, within limits of standard tower design. This would minimize the amount of sensitive features disturbed and/or reduce visual contrast.
6. Standard tower spacing will be modified to correspond to the spacing of existing transmission-line towers where feasible and within limits of standard tower design. This would reduce visual contrast.
7. The line will be rerouted to clearly avoid sensitive features. This would eliminate or severely reduce visual or physical conflict with sensitive features.

Construction Schedule

8. Construction activities will be curtailed during breeding season. This would reduce disturbance to sensitive wildlife species.

Preconstruction Study Programs

9. A preconstruction geotechnical field review of tower and access-road design will be conducted by an appropriately qualified professional in conjunction with the landowner to identify site-specific, soil-erosion impacts and determine the most effective means of mitigating them. Possible mitigation measures could include minor adjustments in tower and

Table 5-2 (continued)
Selectively Committed Mitigation

road locations, restricting access during periods of high moisture and utilizing selective biodegradable soil-stabilizing agents, etc.

10. A preconstruction ecological field review of tower and access-road design will be conducted by a appropriately qualified professional in conjunction with the landowner to identify site-specific impacts to threatened, endangered, or otherwise sensitive vegetation and wildlife and to determine the most effective means to mitigate those impacts. Possible mitigation measures could include minor adjustments in tower and road locations, closing access roads, relocating sensitive species, habitat improvements, etc.

TABLE 5-3 (A)

LOCATIONS OF SELECTIVELY COMMITTED MITIGATION
APS/SDG&E INTERCONNECTION PROJECT

LINK	1. Access to follow Landform	2. Close Access Roads		3. Modify Tower Design		4. Non- specular Con- ductors	5. Modify Tower Placement				6. Modify Tower Spacing	7. Reroute Line		8. Curtail Con- struction	9. Precon- struction Field Review	10. Precon- struction Field Review
	VISUAL	ECOLOGY	PARKS	ECOLOGY	VISUAL	VISUAL	ECOLOGY	LAND USE	PARKS	VISUAL	VISUAL	LAND USE	PARKS	ECOLOGY	GEOTECH.	ECOLOGY
47										0.0- 1.4						
48										0.0- 1.0						
49										0.0- 4.7					0.6- 4.7	
51						0.0- 1.0	0.9- 1.0									0.9- 1.0
52b	0.0- 0.7	0.0- 0.7				0.0- 0.7							0.0- 0.1		0.0- 0.7	
71										0.0- 0.3						
74b										0.0- 0.7						
78						0.0- 3.3									3.2- 3.3	
81	0.0- 2.1	1.0- 2.1				0.0- 2.1	1.0- 2.1			0.0- 2.1					0.0- 2.1	
82						0.0- 0.4				0.0- 0.4						
86						0.0- 1.6 5.5- 6.8	0.0- 0.4 1.0- 5.6									
101						0.0- 2.3	0.0- 0.4						0.1- 0.2		0.0- 0.8	0.0- 0.4
108						0.0- 1.6	0.5- 0.8 3.8- 4.1								0.0- 4.9	0.5- 0.8 3.8- 4.1
110a		1.8- 2.2				0.0- 4.6	1.8- 2.2								0.0- 4.6	1.8- 2.2
117b	1.9- 3.4					0.0- 3.4									0.0- 3.4	
126A						0.0- 5.8	0.0- 5.6				1.0- 5.6				0.0- 5.8	0.0- 5.6
128a						0.0- 1.4	0.0- 1.1								1.2- 1.4	0.0- 1.1
155							0.0- 1.2								0.0- 1.4	0.0- 1.2
156							0.0- 0.3								0.0- 0.6	0.0- 0.3
157							0.3- 0.8					0.1- 0.2			0.0- 2.7	0.3- 0.8
158							0.3- 1.0								0.0- 1.1	0.3- 1.0
159							2.2- 2.5								0.0- 2.5	2.2- 2.5
160															0.0- 1.4	
161															0.0- 1.7	
162															0.0- 3.8	
163															0.0- 1.7	
164							1.1- 1.7								0.0- 1.0	1.1- 1.7
165															0.0- 2.8	

TRANSMISSION

INTRODUCTION

The subsequent section on environmental consequences from the proposed 500kV transmission line describes types of impacts that could be expected for each resource in the natural, human and cultural environment, and potential initial and residual impacts. For the purposes of the SDES, environmental impact has been defined as a modification in the status of the environment, as it presently exists or is anticipated to be, brought about by the proposed action.

Impacts will result:

- If environmental change or stress occurs to biotic populations or natural resources affecting their safety, health, abundance, productivity or aesthetic or cultural values.
- If the change or stress affects the diversity and variety of individual choice, the standard of living, or the extent of sharing of life's amenities.
- If the change or stress affects the quality of renewable resources or the recycling of depletable resources.

Environmental impacts can be positive (beneficial) or negative (adverse) as a primary result of the action (direct) or as a secondary result (indirect), and can be permanent or long-lasting (long-term), or temporary or of short duration (short-term). Impacts can vary in degree or magnitude from no change, or only slightly discernible change, to a total change in the environmental condition or system. Duration of impacts has been defined for the potential and residual impacts described in this chapter as follows:

Short-term impacts are those changes or stresses from construction to the environment, which would revert to generally preconstruction conditions at, or within a few years of, the conclusion of the construction phase. Although short in duration, such impacts are normally obvious and often highly disruptive in nature.

Long-term impacts are those changes or stresses made to the environment during construction and operation that would substantially remain for the life of the proposed Project (50 years) and beyond.

A summary of residual impacts is presented in Table 5-4(A). Maps of residual impacts for geotechnical, ecological, land-use (except agricultural), visual, archaeological and historical resources are presented in Figures 5-2(A) through 5-8(A). Potential air-quality, acoustical and socioeconomic impacts were not mapped, because of their regional, rather than site-specific, nature. In

addition, agricultural impacts were not mapped, because all agricultural impacts were determined to be moderate. Although impact maps were prepared for Native American cultural resources, they will not be distributed with this document. As explained in Chapter 4, Native American cultural-resource information is of an extremely sensitive nature, and was only provided by knowledgeable Native Americans in an effort to protect and preserve resources that might be disturbed or destroyed by the proposed Project. Therefore, no site-specific identification of potential impacts has been provided, either in the text or on maps, for Native American cultural resources, but will be provided for resources preservation or planning purposes on a case-by-case basis. Tables and figures referenced in the text can be found at the end of the chapter.

THE NATURAL ENVIRONMENT

Air Resources

Results are the same as those reported in the Draft Environmental Statement (DES).

Geotechnical Features

No significant (high) impacts to soils were identified; see Figure 5-2(A) for a summary of results. In addition, no impacts were identified for geology, paleontology and hydrology.

Ecological Resources

Impact results are described below in Table 5-4(A) and Figure 5-3(A).

Set IX(R) - Imperial Valley - Potential significant (moderate) residual impacts would occur on Route 1 (15.9 miles), Route 2 (23.9 miles) and Route 3 (34.4 miles). Routes 2 and 3 would cross special-status plant, flat-tailed horned lizard and Yuma clapper rail habitats. Route 1 would cross flat-tailed horned lizard habitat.

Set XI(R) - Tecate Peak - Potential high residual impacts within Set XI(R) would result from the possible disturbance of a raptor nesting area and good-quality vegetation/habitat for unique plant species. Potential high impacts were identified for 5.9 miles along Route 1, 7.3 miles along Route 2, 5.9 miles along Route 3, 6.2 miles along Route 4 and 7.6 miles along Route 5.

Set XIII - Muggins Mountains - Route 1 crosses 2.3 miles of special-status plant habitat (elephant tree) and 12.9 miles of bighorn sheep habitat. Route 2 crosses 0.3 mile of special-status desert wash habitat.

Set XIV - Yuma - High residual impacts would result from crossing the Colorado River on Routes 1, 4, 5 and 6 and potential waterfowl-collision hazards on all routes. Two additional Colorado River crossings associated with Route 4 would result in moderate residual impacts.

Set XV - Sand Hills - Both Routes 1 and 2 cross special-status plants and Andrew's scarab beetle habitat. Total miles of potential residual (moderate) impacts for Route 1 is 0.2 mile; 0.3 mile of residual (moderate) impacts are associated with Route 2.

Connector I(R)) - Connector I(R) crosses 17.0 miles of flat-tailed horned lizard habitat.

THE HUMAN ENVIRONMENT

Land Uses

Social and Economic Land Uses

Impact results are described below and in Table 5-4(A) and Figure 5-4(A). The following sets and connectors would have no high impacts: Set XIII, Routes 1 and 2; Set XIV, Routes 4-6; Set XV, Routes 1 and 2; Connector I(R); Set IX(R), Route 3; and Set XI(R), Routes 1-5.

Set IX(R) - Imperial Valley - One single dwelling was identified along Route 1 causing 0.1 mile of a high impact. Route 2 would have 0.2 mile of high impact and 0.1 mile of moderate impacts due to three single dwellings and one light industry, respectively. Route 3 would have 14.3 miles of moderate impact due to a military reservation crossed and the presence of one light industry, and 0.2 mile of high impact because of three single dwellings.

Set XIV -Yuma - Potential high impacts to social and economic land uses occur along Route 1 for 0.1 mile because of a single dwelling. A moderate impact could occur for 0.6 mile due to four light industries. Along Routes 2 and 3 high impacts would occur for 1.7 miles because of 22 single dwellings and an airstrip within the right-of-way. Moderate impacts could occur for 3.2 miles due to four light industries and two proposed subdivisions. Route 6 could have 0.1 mile of a moderate impact due to a light industry.

Park, Preservation and Recreation

Significant impacts to park, preservation and recreation lands are described below and in Table 5-4(A) and on Figure 5-5(R). No significant impacts would occur along Set XIII, Routes 1 and 2 and Set XIV, Routes 2 and 3.

Set IX(R) - Imperial Valley - A potential moderate impact was identified for 6.7 miles of Route 1 due to crossing a restricted BLM off-road vehicle (ORV) designated roads and trails area. The 5.8 and 19.2 miles of potential moderate impact along Routes 2 and 3, respectively, were caused by crossing restricted BLM-ORV special design and designated roads and trails areas.

Set XI(R) - Tecate Peak - Potential high impacts were identified along 3.1 miles of Route 2 due to the crossing of the Coochama Experimental Forest. A moderate impact for 1.8 miles would occur because a proposed National Natural Landmark was identified. A moderate impact was also identified along 0.7 mile of Route 1 and 1.7 miles of Routes 3, 4 and 5 because of the proposed National Natural Landmark.

Set XIV - Yuma - Potential moderate impacts were identified along 1.4 miles of Routes 1, 4, 5 and 6 caused by crossing the Colorado River along a high-use area and a restricted BLM-ORV designated roads and trails area.

Set XV - Sand Hills - Potential moderate impacts were identified along 4.3 and 5.1 miles of Routes 1 and 2, respectively, due to the crossing of high-use BLM concentrated use zones within the Sand Hills.

Connector I(R) - Potential moderate impacts were identified along 1.7 miles of Connector I(R) due to the crossing of a restricted BLM-ORV special design area.

Agricultural Resources

A moderate level of impact was assigned to all agricultural land regardless of the type of crop potentially impacted. Quantitative and qualitative impacts to agricultural resources along Links 51 and 76 are presented in Table 5-5(A).

Socioeconomic

Increases in property-tax revenues during the operation of the 500kV transmission system and associated ancillary facilities would be a significant long-term beneficial impact. Results in addition to those described in the DES are summarized in Table 5-6(A).

Visual Characteristics

Results are described below and on Table 5-4(A) and Figure 5-6(A).

Set IX(R) - Imperial Valley - The extensive potential high impacts to visual resources are mainly associated with crossing the agricultural land of Imperial Valley, which lacks structures similar to those of the proposed action. Residences associated with agricultural lands were accorded a high visual sensitivity-level. Potential high impacts for Route 1 total 25.6 miles, for Route 2 total 25.2 miles and for Route 3 total 26.6 miles.

Set XI(R) - Tecate Peak - Potential high impacts would be the result of new structures and access roads in areas of high scenic quality (Tecate Peak), high visual sensitivity to nearby residences, and the Coochama Experimental Forest (3.1 miles along Route 2). Potential high impacts were identified for 8.2 miles along Route 1, 7.1 miles along Route 2, 8.0 miles along Route 3, 7.2 miles along Route 4 and 7.6 miles along Route 5.

Set XIII - Muggins Mountains - Potential significant (moderate) impacts to visual resources that occur in this set are usually within proximity to residences and/or are associated with areas of high scenic quality. Areas included are agricultural lands with associated residences, or landscapes of good scenic quality (Class A), such as the Muggins Mountains. Agricultural lands with associated residences are usually Class B scenic quality. The need for new access because of steep topography in the Muggins Mountains would contribute to the impact. Miles of potential moderate impacts remaining after committed mitigation would be as follows: Route 1 - 13.1 miles, Route 2 - 15.7 miles.

Set XIV - Yuma - Potential high impacts in Set XIV would result from proximity to residences, lack of structures similar to the proposed action (structures contrast) and areas of high or average scenic-quality. In this set, Class B areas are mainly agricultural lands, while the riparian areas of the Colorado River are high scenic-quality. In average scenic-quality areas, the proximity to residences would be the primary cause for potential high impacts. The following miles of potential high impact were identified: Route 1 - 17.7 miles, Route 2 - 26.3 miles, Route 3 - 26.3 miles, Route 4 - 3.6 miles, Route 5 - 2.3 miles and Route 6 - 14.6 miles.

Set XV - Sand Hills - The majority of potential significant visual impacts in this set would be the result of crossing the Algodones Dunes, a unique area characterized by high scenic quality (Class A). The high visual sensitivity of the routes that cross the Dunes reflects their very high use for recreational activities, and the high degree of sensitivity to visual change. A total of 4.6

miles of potential high impacts was identified for Route 1 and 4.6 miles of high impacts along Route 2.

Connector 1(R) - Potential high impacts were identified for 0.3 mile along Connector 1(R). The potential high impact would occur on the extreme west end of the route where it crosses agricultural lands in proximity to residences.

Acoustical Characteristics

Results are the same as those described in the DES.

THE CULTURAL ENVIRONMENT

Generically committed mitigation (Table 5-1, No. 11) provides for intensive cultural-resource surveys so that impacts to resources may be avoided, or specific mitigation developed appropriate for each resource potentially impacted.

Note to Reviewers

All sites identified during archaeological surveys will be reviewed by the Arizona and California State Historic Preservation Officers (SHPOs) for potential inclusion in the National Register of Historic Places. Determination of eligibility, determination of effect and identification of measures to avoid or mitigate any adverse effects will follow procedures prescribed in 36 CFR 800 and 36 CFR 1204.

Archaeological Resources

Set IX(R) - Imperial Valley - Portions of all three routes of Set IX(R) cross or are in proximity to the ancient shoreline of Lake Cahuilla, an area which has been identified by the BLM as having "very high sensitivity." Site densities are considered by the BLM as being "severe" in portions of the area. Proposed new and upgraded access would impact archaeological resources encountered.

Route 1 crosses 15.3 miles of high probability areas and 15.2 miles of high impacts are expected. Route 2 crosses 14.2 miles of "identified special areas" (ISAs), 8.9 miles of high probability areas and 20.1 miles of high impacts are expected. Route 3 crosses 21.4 miles of ISAs, 26.2 miles of high probability areas and 37.1 miles of high impacts are expected.

Set XI(R) - Tecate Peak - Potential high impacts are expected for 0.7 mile of Route 1 where numerous sites have been previously recorded. Generally,

Route 2 traverses areas of high probability where the route crosses major drainages and 3.4 miles of high impacts are expected.

Route 3 crosses 6.0 miles of high probability areas in which major drainages are located and archaeological resource sites have been recorded. Route 4 crosses 5.8 miles of high probability having major drainages. New and upgraded access are proposed along both Routes 3 and 4, and high impacts for 4.0 miles and 3.5 miles, respectively, are anticipated for both routes.

High impacts for 1.9 miles are expected along Route 5. This route crosses 6.3 miles of high probability in which a number of sites have been recorded. New and upgraded access are proposed.

Set XIII - Muggins Mountains - This set lies in proximity to the Gila River where the presence of vegetation of value to Native American cultures ranges from sparse to abundant. Along Route 1, there are 6.5 miles of high probability areas in which two sites have been recorded. Proposed new access would directly impact archaeological resources encountered. High impacts to 6.5 miles are anticipated. Route 2 crosses 15.3 miles of high probability where 19 sites have been recorded. High impacts, however, are not expected.

Set XIV - Yuma - Along the six routes of Set XIV, areas where there is a high probability of encountering prehistoric sites are located primarily in areas of the terraces of the Gila and Colorado rivers, bases of the Muggins, Gila and Laguna mountains, major washes, ancient alluvium, desert pavement-covered ridges and terraces and areas considered sensitive. "Identified special areas" within Set XIV are associated with the BLM Picacho sensitivity area where numerous prehistoric sites have been recorded including early (San Dieguito I) sites. Also in the Picacho area there is a proposed ACEC and a portion of the Pilot Knob area is being nominated to the National Register. Proposed new and upgraded access would adversely impact sites encountered.

Along Route 1 there are 8.4 miles of ISAs, 16.5 miles of high probability and 15.5 miles of potential high impacts expected. Both Routes 2 and 3 have 1.9 miles of ISAs, 5.9 miles of high probability and 5.3 miles of potential high impacts. Route 4 has 12.1 miles of ISAs, 25.1 miles of high probability and 26.7 miles of potential high impacts. Route 5 has 8.4 miles of ISAs, 18.0 miles of high probability and 19.0 miles of potential high impacts. Identified along Route 6 are 8.4 miles of ISAs, 17.1 miles of high probability and 15.6 miles of potential high impacts.

Set XV - Sand Hills - Although areas of high probability were identified along both Route 1 (1.2 miles) and Route 2 (1.4 miles), no high impacts are expected within Set XV.

Connector I(R) - Connector I(R) traverses an ISA (3.3 miles) which is in an area of a BLM proposed ACEC and considered to have a "severe density" of prehistoric sites. A total of 10.4 miles of high probability and 3.3 miles of potential high impacts were identified. Proposed new and upgraded access would directly and indirectly impact sites encountered.

Historical Resources

Impact results are described below and in Table 5-4(A) and on Figure 5-8(A). No potential significant impacts to historical resources are expected on Sets XI(R), XIII, XV and Connector I(R).

Set IX(R) - Imperial Valley - Potential high impacts to a historical resource, because of potential public value, were identified along Route 3 of Set IX(R). The natural setting of the Southern Emigrant (Butterfield) Road, the modern successor of the important nineteenth-century overland route, would be significantly affected.

Set XIV - Yuma - Potential high impacts to an important historical site complex were identified along Routes 2, 3 and 4 of Set XIV. Pilot Knob Historic Native American Site, a trail and petroglyph complex, is a unique and physically sensitive historic site that could be subjected to direct physical and long-term visual impacts.

Native American Cultural Resources

Impact results are described below and shown on Table 5-4(A). No potential high impacts to Native American cultural resources are anticipated for Set XV and Connector I(R).

Set IX(R) - Imperial Valley - Potential high impacts were identified along Route 3 of Set IX(R). The visual integrity of hills and mountains sacred to Kumeyaay-Kamia Native Americans as well as a cremation/burial area would be significantly impacted.

Set XI(R) - Tecate Peak - Potential high impacts to Native American cultural resources have been identified along Routes 1 and 2 of Set XI(R). Route 1 crosses a Kumeyaay village and would physically affect the site. Along Route 2, the integrity of a sacred mountain and a major Kumeyaay village area would be significantly affected.

Set XIII - Muggins Mountains - Potential high impacts were identified along Route 1. The integrity of a sacred peak, known in Quechan and Cocopah oral history, would be significantly affected.

Set XIV - Yuma - Native American cultural resources which could be significantly affected (high impacts) along the six routes of Set XIV include Fort Yuma Indian Reservation, multiple-resource areas, the Lizard and Horse intaglios, a trail (sacred to the Quechan) and Quechan/Cocopah cemetery. Identified along Route 1 are the reservation, two multiple-resource areas and a sacred trail. Routes 2 and 3 include the reservation, cemetery, intaglio sites and Pilot Knob multiple-resource area. Along Route 4 are the reservation, intaglio sites, two multiple-resource areas (including Pilot Knob) and sacred trail. Along Routes 5 and 6 are the reservation, sacred trail and two multiple-resource areas. The physical, visual and, in most cases, aural integrity of these cultural resources, would be affected.

ANCILLARY FACILITIES

INTRODUCTION

The intent of the impact-assessment process was to evaluate the type and degree of change generally brought about by the construction and operation of typical ancillary facilities, which include substations, a 69kV transmission system, a 161kV transmission line and a microwave communication system.

Generalized impact-assessment information was assembled for each component of ancillary facilities by reviewing the Phase II Corridor Studies and Phase II Corridor Studies - Addendum reports. Supplemental impact and resource-sensitivity information was obtained through additional studies of selected environmental resources. For a description of impact types and impact-assessment criteria, refer to the appropriate sections in the primary source documents in Chapter 4.

The following narrative describes significant initial impacts expected from the various ancillary facilities. Other impacts are summarized in Tables 5-4(A), 5-7(A), 5-9(A), 5-10(A) and 5-11. Impact results for the 69kV/161kV routes are presented by resource in Table 5-4(A) following results for the 500kV transmission line routes.

Results of the socioeconomic study (including construction-worker, expenditure and fiscal analysis) for all components of ancillary facilities concluded that a beneficial impact would result to the study area from the proposed Project (see Table 5-10(A)).

SUBSTATION

Significant impacts are described below, and other impacts are shown in Table 5-7(A), 5-10(A) and 5-11.

The Gila Substation will have an overall moderate impact on ecological resources. Although the area has moderate habitat quality, a high impact could result to the flat-tailed horned lizard because of potential elimination of its habitat.

The North Gila Substation will have a moderate impact level for archaeological resources due to a high probability of archaeological resources in the study area. A moderate impact level was also accorded to historic resources because of the potential visual impact to the San Ysidro Hacienda ruins located just south of the site. A high-to-moderate visual impact (depending on exact site location) is expected due to high/critical visibility and a strong structures contrast in a Class II management area.

Possible mitigation measures include: (1) avoiding sensitive environmental features in siting the switchyard, (2) large steel structures painted to blend with the surrounding landscape, and (3) site landscaping.

69kV TRANSMISSION LINE

A significant impact (moderate) could occur to ecological resources on routes that cross riparian areas and creosotebush communities with flat-tailed horned lizard habitat. A high impact could result along Link 201, where it crosses N.R. Adair County Park, due to conflicts in land-use activities. Significant (moderate) impacts to historic sites would occur along Links 201, 202, 206, 210 and 211. The Dome Valley Route would significantly impact Native American cultural resources. Moderate visual impacts would occur throughout the alternative corridor system due to visibility of nearby residences and moderate structures contrast. Possible mitigation of ecological impacts would include selective tower placement to avoid sensitive features. Other impacts are described in Tables 5-4(A), 5-10(A) and 5-11.

161kV TRANSMISSION LINE

A potential high impact to the ecological resources could occur along 2.3 miles of Corridor B-2, B-D as well as 1.5 miles of Corridor D-2, B-D because of an important waterfowl rookery and the potential waterfowl-collision hazard. A high impact to archaeological resources could occur along 0.3 mile of Corridor D-2, B-D due to a projected high density of sites. Possible mitigation to the high impact to ecological resources would include selective tower placement to avoid sensitive features. Other impacts are shown in Tables 5-4(A), 5-10(A) and 5-11.

MICROWAVE COMMUNICATION SYSTEM

The San Miguel Mountain site could highly impact Native American cultural resources based on the type and sensitivity of identified sites. No other potential significant impacts would occur at this site. No impacts are expected for the Mission Control Center site, as no new development would take place. Other impacts are shown on Tables 5-9(A) and 5-10(A).

SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

Significant unavoidable adverse impacts are summarized below by resource for the environmentally preferred routes, except for resources where no significant impacts occur.* No significant unavoidable adverse impacts were identified to geotechnical resources, socioeconomics, air resources and acoustical characteristics.

<u>Resource Category</u>	<u>Significant Unavoidable Adverse Impacts</u>
Ecological Resources	<u>PVNGS to Yuma</u> - Highly stress or potentially eliminate 11.0 miles of special-status plant habitat and habitat of the Gila monster. <u>Yuma (Arizona Southern)</u> - Highly stress or potentially eliminate habitat of the flat-tailed horned lizard; possible bird-collision hazard at Colorado River crossing. <u>Yuma (Arizona Northern)</u> - Possible bird-collision hazard at Colorado River crossing. <u>Yuma (California Southern)</u> - Possible bird-collision hazard at Colorado River crossing. <u>Yuma (California Northern)</u> - Possible bird-collision hazard at Colorado River crossing. <u>Sand Hills - Mission Tap</u> - Highly stress or potentially eliminate 79.6 miles of special-status plant habitat; highly stress or potentially eliminate raptor nesting areas, and habitats of Andrew's scarab beetle, flat-tailed horned lizard, magic gecko and bighorn sheep.

*Significant unavoidable adverse impacts for substations, 69kV system, 161kV lines and microwave towers are discussed under Ancillary Facilities.

Social and Economic Land Uses

PVNGS to Yuma - A total of four single-family dwellings could be highly impacted; one airstrip could be traversed.

Yuma (Arizona Southern) - A total of 22 single-family dwellings, one airstrip and two subdivisions could be highly impacted.

Sand Hills - Mission Tap - A total of one single-family dwelling and one mobile home could be highly impacted.

Park, Preservation and Recreation

Yuma (California Southern) - The route would cross one area of park, preservation and recreation land-use.

Yuma (California Northern) - The route would cross several areas of park, preservation and recreation land-use.

Sand Hills - Mission Tap - Potential conflict with stated management policies for two BLM-ORV areas; cross the Pacific Crest Trail, a proposed National Natural Landmark, a California hiking and riding trail, an Outstanding Natural Area, a golf course, and an existing and proposed county park.

Agricultural Resources

PVNGS to Yuma - Cross approximately 8.5 miles of agricultural land and remove 3.6 acres from production for the life of the Project.

Yuma (Arizona Southern) - Cross approximately 17.8 miles of agricultural land and remove 7.1 acres from production for the life of the Project.

Yuma (Arizona Northern) - Cross approximately 2.0 miles of agricultural land and remove 1.0 acres from production for the life of the Project.

Sand Hills-Mission Tap - Cross approximately 22.4 miles of agriculture and remove 10.1 acres from production for the life of the Project.

Visual Resources

Yuma (Arizona Southern) - The route would be visible from residences and would create structures contrast resulting in significant (high) impacts for 25.5 miles.

Yuma (Arizona Northern) - The route would traverse areas of moderate-to-high scenic quality, be visible from residences and would create structures and landform contrast resulting in 13.4 miles of significant (high) impacts.

Yuma (California Southern) - The route would traverse areas of moderate-to-high scenic quality and would create structures and landform contrast resulting in 0.8 mile of high impact.

Yuma (California Northern) - The route would traverse areas of moderate-to-high scenic quality and would create structures and landform contrast resulting in 1.2 miles of significant (high) impact.

Sand Hills - Mission Tap - The route would traverse areas of moderate-to-high scenic quality, be visible from residences and would create structures and landform contrast resulting in 77.6 miles of high impact.

Cultural Resources

PVNGS to Yuma - Cultural-resource sites important to Native Americans could be affected by this route and previously recorded archaeological sites may be crossed.

Yuma (Arizona Southern) - Cultural resources important to Native Americans could be affected by this route.

Yuma (Arizona Northern) - Cultural resources important to Native Americans could be affected by this route.

Cultural Resources (continued)

Yuma (California Southern) - The route would traverse an area of archaeological, historical and Native American concern designated as an ACEC by the BLM.

Yuma (California Northern) - The route would traverse areas of archaeological concern designated by the BLM as having "very high" sensitivity and numerous cultural resource sites of Native American concern.

Sand Hills - Mission Tap - The route would traverse areas of archaeological concern designated by the BLM as having "very high" sensitivity and "severe density" of sites. One historical site and numerous cultural-resource sites of Native American concern would be potentially affected.

SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY

For the purposes of this section, short-term has been defined as 50 years (the estimated life of the proposed Project), and long-term as the period thereafter.

Within the life of the proposed project, the construction phase would represent the period of greatest impact to the physical environment, involving disturbance for access roads (399 acres for the Southern Preferred Route and 445 acres for the Northern Preferred Route), transmission-tower-and-line installation (1,030 acres for the Southern Preferred Route and 1,020 acres for the Northern Preferred Route), 0.6 acre for the installation of communications facilities and 124.6 acres for installation of substations. The construction of the proposed 500kV transmission line would entail the greatest short-term impacts, because of its requirements for new right-of-way (285 miles for the Southern Preferred Route and 279 miles for the Northern Preferred Route). Construction of the proposed 230kV, 161kV and 69kV transmission lines, however, would create much less severe short-term impacts, because all lines would be considerably shorter (23.9 miles, 17.5 miles, and 15.7 to 36.5 miles, respectively), and because the 230kV transmission line would be built entirely within an existing transmission-line corridor and the 69/161kV transmission lines may parallel existing rights-of-way throughout most of their length. In addition, three or four of the proposed substations (depending on route taken) and seven of the proposed microwave towers would be located at existing sites.

Following the construction phase of the proposed action, the majority of land disturbed during construction would begin to revert to its preconstruction use. Some access roads would be closed, and approximately 185 acres would be occupied by the transmission-line towers, microwave towers and substations.

Potential effects on air quality would be short-term, mainly localized, and largely the result of construction and abandonment activities, which would create fugitive dust and gaseous emissions from ground- and air-transport. No short- or long-term effects on water resources are anticipated. There would, however, be some short- and long-term soil erosion and disturbance to sand dunes. No known geotechnical hazards - such as subsidence, flooding, hydrocompaction or faulting - would be exacerbated, either short- or long-term.

Potential effects on ecological resources would be both short- and long-term, because of loss and displacement of vegetative and wildlife species, although no vegetative or wildlife species is expected to become extinct as a direct result of Project-related activities. Wildlife habitat recovery would vary according to vegetative type, e.g., riparian areas would recover more quickly from disturbance than desert areas.

Potential effects on land use would be both short- and long-term. Between 14.7 and 20.8 acres (Preferred North and South, respectively) of land would be

removed from agricultural production over the life of the Project, and would continue out of production beyond 50 years, if Project-related facilities were not dismantled and removed when no longer needed. Future land-use plans and planning would also be affected, and to some extent determined, by the location of the proposed Project facilities.

Park, preservation and recreation areas could be expected to experience limited and site-specific short- and long-term impacts. Some areas, if committed to the Project, could no longer be considered potential for wilderness or primitive areas, or other special status; some areas, by virtue of new access roads, might be opened up to ORVs, while still others might provide limited recreational use, except where the presence of the proposed Project facilities could pose problems of safety to humans or animals.

Regional and local economies could be expected to experience short-term benefits from Project-related expenditures. No long- or short-term dislocations to local infrastructures are anticipated, because of the small numbers of workers, for relatively short periods of time, that would be required at various construction points over the construction period.

Short-term visual and acoustical impacts would occur throughout the entire Project area. Long-term visual impacts would depend on abandonment procedures. Cultural resources, which are nonrenewable, would be impacted both short-and long-term. Those resources destroyed or removed during construction, maintenance and abandonment would be lost forever. Historical and Native American resources that were disturbed visually would experience only short-term impacts if Project-related facilities were removed when no longer needed.

In brief, most resources within the natural, human and cultural environments would experience short-term impacts, principally from construction activities. Some long-term effects and productivity would depend on the continued existence of the proposed Project's facilities, or the continued use of the right-of-way as a utility corridor.

V

TABLES

TABLE 5-4 (A)
SUMMARY OF ENVIRONMENTAL CONSEQUENCES
TOTAL MILES/ROUTE

Legend

S = Sufficient Access H = High
U = Upgraded Access M = Moderate
N = New Access L = Low
T = Total N = No Identifiable Impact

Route ID	Access			Natural Environment		Human Environment			Cultural Environment		
	Type	Miles	Impact	Geotech	Ecology	Parks	Land Use	Visual	Archaeo	Historic (#Sites)	Nat Am (#Sites)
SET IX(R) - IMPERIAL VALLEY											
ROUTE 1	S	25.0	H	0.0	0.0	0.0	0.2	25.6	15.2	0	0
	U	0.0	M	0.0	15.9	6.7	0.0	15.3	0.8	0	1
	N	15.9	L	40.9	25.0	9.7	29.5	0.0	24.9	1	0
	T	40.9	N	0.0	0.0	24.5	11.2	0.0	0.0	0	0
			T	40.9	40.9	40.9	40.9	40.9	40.9	1	1
ROUTE 2	S	45.7	H	0.0	0.0	0.0	0.2	25.2	20.1	0	0
	U	6.5	M	0.0	23.9	5.8	0.1	29.2	3.9	0	3
	N	6.6	L	58.8	34.9	16.1	42.5	4.4	34.9	1	0
	T	58.8	N	0.0	0.0	36.9	16.0	0.0	0.0	0	0
			T	58.8	58.8	58.8	58.8	58.8	58.8	1	3
ROUTE 3	S	33.3	H	0.0	0.0	0.0	0.2	26.6	37.1	1	3
	U	21.1	M	0.0	34.4	19.2	14.3	43.8	16.3	0	0
	N	22.4	L	76.8	42.4	12.4	36.9	6.4	23.5	1	3
	T	76.8	N	0.0	0.0	45.2	25.4	0.0	0.0	0	0
			T	76.8	76.8	76.8	76.8	76.8	76.8	2	6
SET XI(R) - TECATE PEAK											
ROUTE 1	S	2.4	H	0.0	5.9	0.0	0.0	8.2	0.7	0	1
	U	7.3	M	0.0	4.5	0.7	0.0	3.5	7.9	1	1
	N	2.0	L	11.7	1.3	0.0	0.5	0.0	3.1	3	1
	T	11.7	N	0.0	0.0	11.0	11.2	0.0	0.0	0	0
			T	11.7	11.7	11.7	11.7	11.7	11.7	4	3
ROUTE 2	S	0.0	H	0.0	7.3	3.1	0.0	7.1	3.4	0	2
	U	7.3	M	0.0	7.5	1.8	0.0	7.7	11.1	0	0
	N	7.5	L	14.8	0.0	0.5	0.3	0.0	0.3	2	0
	T	14.8	N	0.0	0.0	9.4	14.5	0.0	0.0	0	0
			T	14.8	14.8	14.8	14.8	14.8	14.8	2	2
ROUTE 3	S	0.0	H	0.0	5.9	0.0	0.0	8.0	4.0	0	0
	U	5.8	M	0.0	6.5	1.7	0.0	4.4	8.3	1	2
	N	6.6	L	12.4	0.0	0.0	2.5	0.0	0.1	9	1
	T	12.4	N	0.0	0.0	10.7	9.9	0.0	0.0	0	0
			T	12.4	12.4	12.4	12.4	12.4	12.4	10	3
ROUTE 4	S	0.0	H	0.0	6.2	0.0	0.0	7.2	3.5	0	0
	U	6.8	M	0.0	6.4	1.7	0.0	5.4	8.0	1	2
	N	5.8	L	12.6	0.0	0.0	2.5	0.0	1.1	9	1
	T	12.6	N	0.0	0.0	10.9	10.1	0.0	0.0	0	0
			T	12.6	12.6	12.6	12.6	12.6	12.6	10	3
ROUTE 5	S	0.6	H	0.0	7.6	0.0	0.0	7.6	1.9	0	0
	U	8.8	M	0.0	4.1	1.7	0.0	5.4	10.0	3	2
	N	3.6	L	13.0	1.3	0.0	2.1	0.0	1.1	3	1
	T	13.0	N	0.0	0.0	11.3	10.9	0.0	0.0	0	0
			T	13.0	13.0	13.0	13.0	13.0	13.0	6	3

Source: Wlrth Associates, Inc., Apr 1981

TABLE 5-4(A) SUMMARY OF ENVIRONMENTAL CONSEQUENCES (Continued)

Route ID	Access			Natural Environment		Human Environment			Cultural Environment		
	Type	Miles	Impact	Geotech	Ecology	Parks	Land Use	Visual	Archaeo	Historic (#Sites)	Nat Am (#Sites)
SET XIII - MUGGINS MOUNTAINS											
ROUTE 1	S	0.0	H	0.0	0.0	0.0	0.0	0.0	6.5	0	1
	U	0.0	M	11.7	11.2	0.0	0.0	13.1	6.6	0	0
	N	13.1	L	1.4	1.9	0.0	11.0	0.0	0.0	0	0
	T	13.1	N	0.0	0.0	13.1	2.1	0.0	0.0	0	0
			T	13.1	13.1	13.1	13.1	13.1	13.1	0	1
ROUTE 2	S	10.1	H	0.0	0.0	0.0	0.0	0.0	0.0	0	0
	U	5.6	M	1.4	3.9	0.0	0.0	15.7	15.3	0	0
	N	0.0	L	14.3	11.8	0.0	0.8	0.0	0.4	0	1
	T	15.7	N	0.0	0.0	15.7	14.9	0.0	0.0	0	0
			T	15.7	15.7	15.7	15.7	15.7	15.7	0	1
SET XIV - YUMA											
ROUTE 1	S	15.8	H	0.0	0.4	0.0	0.1	17.7	15.5	0	1
	U	6.1	M	0.0	10.5	1.4	0.6	22.2	12.8	5	4
	N	23.4	L	45.3	34.4	3.7	11.2	5.4	17.0	10	2
	T	45.3	N	0.0	0.0	40.2	33.4	0.0	0.0	2	0
			T	45.3	45.3	45.3	45.3	45.3	45.3	17	7
ROUTE 2	S	33.9	H	0.0	0.0	0.0	1.7	26.3	5.3	1	5
	U	6.1	M	0.0	3.6	0.0	3.2	11.5	4.1	1	3
	N	4.4	L	44.4	40.8	7.1	24.6	6.6	35.0	5	4
	T	44.4	N	0.0	0.0	37.3	14.9	0.0	0.0	1	0
			T	44.4	44.4	44.4	44.4	44.4	44.4	8	12
ROUTE 3	S	33.9	H	0.0	0.0	0.0	1.7	26.3	5.3	1	5
	U	6.1	M	0.0	3.6	0.0	3.2	11.5	4.1	1	3
	N	4.4	L	44.4	40.8	7.1	24.6	6.6	35.0	5	4
	T	44.4	N	0.0	0.0	37.3	14.9	0.0	0.0	1	0
			T	44.4	44.4	44.4	44.4	44.4	44.4	8	12
ROUTE 4	S	9.6	H	0.0	0.4	0.0	0.0	3.6	26.7	1	11
	U	10.7	M	8.6	11.4	1.4	0.0	27.6	12.2	4	4
	N	25.6	L	37.3	34.1	13.3	9.8	14.7	7.0	16	6
	T	45.9	N	0.0	0.0	31.2	36.1	0.0	0.0	5	0
			T	45.9	45.9	45.9	45.9	45.9	45.9	26	21
ROUTE 5	S	6.3	H	0.0	0.4	0.0	0.0	1.6	19.0	0	3
	U	3.5	M	8.6	10.6	1.4	0.0	25.8	10.8	4	4
	N	26.9	L	28.1	25.7	4.3	7.3	9.3	6.9	9	0
	T	36.7	N	0.0	0.0	31.0	29.4	0.0	0.0	3	0
			T	36.7	36.7	36.7	36.7	36.7	36.7	16	7
ROUTE 6	S	10.2	H	0.0	0.4	0.0	0.0	14.6	15.6	0	3
	U	4.7	M	0.0	10.8	1.4	0.1	18.8	13.3	5	5
	N	23.9	L	38.8	27.6	3.7	5.4	5.4	9.9	9	0
	T	38.8	N	0.0	0.0	33.7	33.3	0.0	0.0	2	0
			T	38.8	38.8	38.8	38.8	38.8	38.8	16	8
SET XV - SAND HILLS											
ROUTE 1	S	0.0	H	0.0	0.0	0.0	0.0	4.6	0.0	0	0
	U	0.2	M	0.0	0.2	4.3	0.0	1.2	5.8	1	0
	N	5.6	L	5.8	5.6	1.5	0.0	0.0	0.0	0	0
	T	5.8	N	0.0	0.0	0.0	5.8	0.0	0.0	0	0
			T	5.8	5.8	5.8	5.8	5.8	5.8	1	0

Source: Wirth Associates, Inc., Apr 1981

TABLE 5-4(A) SUMMARY OF ENVIRONMENTAL CONSEQUENCES (Continued)

Route ID	Access		Natural Environment			Human Environment			Cultural Environment		
	Type	Miles	Impact	Geotech	Ecology	Parks	Land Use	Visual	Archaeo	Historic (#Sites)	Nat Am (#Sites)
SET XV - SAND HILLS (Continued)											
ROUTE 2	S	0.0	H	0.0	0.0	0.0	0.0	4.6	0.0	0	0
	U	0.0	M	0.0	0.3	5.1	0.0	0.5	2.2	1	0
	N	5.1	L	5.1	4.8	0.0	0.0	0.0	2.9	0	0
	T	5.1	N	0.0	0.0	0.0	5.1	0.0	0.0	0	0
			T	5.1	5.1	5.1	5.1	5.1	5.1	1	0
CONNECTOR 1(R)											
	S	2.2	H	0.0	0.0	0.0	0.0	0.3	3.3	0	0
	U	16.1	M	0.2	17.8	1.7	0.0	1.8	15.3	1	0
	N	2.4	L	20.5	2.9	4.8	0.7	18.6	2.1	0	0
			N	0.0	0.0	14.2	20.0	0.0	0.0	0	0
	T	20.7	T	20.7	20.7	20.7	20.7	20.7	20.7	1	0
ANCILLARY FACILITIES: 69 kV TRANSMISSION LINE											
69 kV-RT 1	S	10.0	H	0.0	0.0	0.0	0.0	0.0	0.0	0	0
	U	0.0	M	0.0	0.5	0.0	2.6	8.2	0.0	0	3
	N	0.0	L	10.0	9.5	1.2	7.2	1.8	10.0	0	1
			N	0.0	0.0	8.8	0.2	0.0	0.0	1	0
	T	10.0	T	10.0	10.0	10.0	10.0	10.0	10.0	1	4
69 kV-RT 2	S	15.7	H	0.0	0.0	0.0	0.0	0.0	0.0	0	0
	U	0.0	M	0.0	7.5	0.0	0.1	9.9	0.0	0	0
	N	0.0	L	15.7	8.2	1.2	14.4	5.8	15.7	1	0
			N	0.0	0.0	14.5	1.2	0.0	0.0	0	0
	T	15.7	T	15.7	15.7	15.7	15.7	15.7	15.7	1	0
69 kV-RT 3	S	36.5	H	0.0	0.0	0.0	0.0	0.0	0.0	0	0
	U	0.0	M	0.0	9.8	0.0	2.5	21.6	0.0	1	0
	N	0.0	L	36.5	26.7	1.2	26.3	14.9	36.5	2	0
			N	0.0	0.0	35.3	7.7	0.0	0.0	1	1
	T	36.5	T	36.5	36.5	36.5	36.5	36.5	36.5	4	1
69 kV-RT 4	S	55.6	H	0.0	0.0	1.5	0.0	0.0	0.0	0	3
	U	0.0	M	0.0	11.5	0.0	2.7	39.2	0.0	2	0
	N	0.0	L	55.6	44.1	1.2	36.4	16.4	55.6	6	0
			N	0.0	0.0	52.9	16.5	0.0	0.0	3	1
	T	55.6	T	55.6	55.6	55.6	55.6	55.6	55.6	11	4
ANCILLARY FACILITIES: 161kV TRANSMISSION LINE											
161 kV-RT 1	S	17.2	H	0.0	1.5	0.0	0.0	0.0	0.3	0	0
	U	0.0	M	0.0	0.3	0.0	1.3	8.8	0.5	1	0
	N	0.3	L	17.5	15.7	0.8	16.1	8.7	16.7	2	1
			N	0.0	0.0	16.7	0.1	0.0	0.0	0	0
	T	17.5	T	17.5	17.5	17.5	17.5	17.5	17.5	3	1
161 kV-RT 2	S	20.8	H	0.0	2.3	0.0	0.0	0.0	0.0	0	0
	U	0.0	M	0.0	3.6	0.0	2.3	10.9	3.1	1	0
	N	3.4	L	24.2	18.3	5.5	21.1	13.3	21.1	3	1
			N	0.0	0.0	18.7	0.8	0.0	0.0	0	0
	T	24.2	T	24.2	24.2	24.2	24.2	24.2	24.2	4	1

Source: Wirth Associates, Inc., Apr 1981

TABLE 5-5(A)
SUMMARY OF CROP LOSS AND ADDITIONAL
FARMING OPERATION COSTS (in 1978 Dollars)

		Estimated Cost of Loss of Crops	Estimated Additional Operation Costs	Estimated Loss of Cropping Acres
<u>Set IX(R) - Imperial Valley</u>				
Route 1	Annual	\$ 10,000	\$ 6,700	10.14
	Construction	67,000	11,700	66.32
Route 2	Annual	12,900	8,800	14.92
	Construction	62,000	13,600	83.82
Route 3	Annual	7,800	5,800	8.61
	Construction	41,000	10,200	57.58
<u>Set XIII - Muggins Mountains</u>				
Route 1	Annual	0	0	0
	Construction	0	0	0
Route 2	Annual	100	100	0.15
	Construction	800	200	1.45
<u>Set XIV - Yuma</u>				
Route 1	Annual	2,100	2,000	3.59
	Construction	11,200	2,500	17.89
Route 2	Annual	5,900	4,100	7.14
	Construction	117,500	34,800	50.14
Route 3	Annual	5,900	4,100	7.14
	Construction	117,500	34,800	50.14
Route 4*	Annual	400	700	1.02
	Construction	1,200	1,600	3.32
Route 5	Annual	500	300	0.44
	Construction	3,000	400	1.88
Route 6	Annual	900	700	1.06
	Construction	5,800	3,200	6.25

* Because Route 4 doubles back from Yucca Substation on Links 70 and 124a, impacts on Links 70 and 124a have been counted twice.

Source: Wirth Associates, Inc., February 1981. (Derived from information provided by Resources International.)

TABLE 5-6(A)*
PROJECTED TOTAL TAX REVENUES
(1979 Tax Schedules)
BY ROUTE
(1979 Dollars)

<u>Route</u>	<u>Amount of Tax (For one year)</u>
Set IX(R) - Route 1	\$ 118,833
Set IX(R) - Route 2	161,275
Set IX(R) - Route 3	215,222
Set XI(R) - Route 1	39,579
Set XI(R) - Route 2	49,623
Set XIII - Route 1	184,084
Set XIII - Route 2	213,775
Set XIV - Route 1	286,003
Set XIV - Route 2	407,707
Set XIV - Route 3	407,707
Set XIV - Route 4	170,986
Set XIV - Route 5	122,696
Set XIV - Route 6	220,138
Set XV - Route 1	25,305
Set XV - Route 2	18,425
Connector I(R)	64,799

*Refer to Table 4-8(A) for Tax-Rate Area and Counties.

Source: Wirth Associates, Inc., 1981. (Derived from information provided by Mountain West Research, Inc.)

TABLE 5-7(A)
SUBSTATION - IMPACT LEVELS

Substation Site	Impact Levels	THE NATURAL ENVIRONMENT				THE HUMAN ENVIRONMENT			THE CULTURAL ENVIRONMENT			
		Geo.	Ecol.	Air	Vis.	Se. Lu.	R. Lu.	Ag.	Ac.	Ar.	His.	N.A.
Gila	High											
	Moderate											
	Low	X	X	X	X	X			X	X		
	None						X	X			X	X
North Gila	High											
	Moderate				X						X	
	Low	X	X	X					X	X		
	None					X	X	X				X
Dome Valley	High											
	Moderate		X									
	Low	X		X	X				X	X		
	None					X	X	X			X	X

Geo. - Geotechnical Features
Ecol. - Ecological Resources
Air - Air Resources
Vis. - Visual Resources
Se.Lu. - Social and Economic Land Uses
R.Lu. - Park, Preservation and Recreation Areas

Ag. - Agricultural
Ac. - Acoustical Resources
Ar. - Archaeological Resources
His. - Historical Resources
N.A. - Native American Cultural Resources

Source: Wirth Associates

TABLE 5-9(A)
COMMUNICATION FACILITIES IMPACT LEVELS

Microwave Communi- ation Site	Impact Levels	THE NATURAL ENVIRONMENT			THE HUMAN ENVIRONMENT			THE CULTURAL ENVIRONMENT			
		Geo.	Ecol.	Air	Vis	Se. Lu.	R. Lu.	Ac.	Ar.	His.	N.A.
Mission Control Center	High										
	Moderate										
	Low										
	None	X	X	X	X	X	X	X	X	X	X
San Miguel Mountain	High										
	Moderate		X								
	Low	X			X				X		
	None			X		X	X	X		X	
Monument Peak	High										
	Moderate	X					X				
	Low		X	X	X				X		
	None					X		X		X	X

Geo. - Geotechnical Features

Ecol. - Ecological Features

Air - Air Resources

Vis. - Visual Resources

Se.Lu. - Social and Economic Land Uses

R.Lu. - Park, Preservation and Recreation Area

Ac. - Acoustical Resources

Ar. - Archaeological Resources

His. - Historic Resources

N.A. - Native American Cultural
Resources

Source: Wirth Associates, Inc.

TABLE 5-10(A)*
PROJECTED TOTAL TAX REVENUES
ANCILLARY FACILITIES

<u>Facility/Site</u>	<u>Amount of Tax (For one year)</u>
<u>Substations</u>	
Yucca	\$ 640,000
Gila	491,488
North Gila	549,443
Dome Valley	549,433
<u>69kV Transmission Line Alternatives</u>	
Yucca Alternatives	24,699
Gila Alternatives	40,127
North Gila Alternatives	98,007
Dome Valley Alternatives	135,773
<u>161kV Transmission Line Alternatives</u>	
Alternative D-2, B-D	32,816
Alternative B-2, B-D	44,448
<u>Microwave Facilities</u>	
San Miguel Mountain Mission Control Center ^a	5,295

Source: Mountain West Research, Inc., January 1981.

*Refer to Table 4-13 to Tax-Rate Areas and Counties, February 1980.

^aNot applicable to facility.

TABLE 5-11
SUMMARY OF CROP LOSS AND ADDITIONAL
FARMING OPERATION COSTS (IN 1978 DOLLARS)
ANCILLARY FACILITIES

		Estimated Cost of Loss of Crops	Estimated Additional Operation Costs	Estimated Loss of Cropping Acres
<u>Substations</u>				
Yucca*	Annual Construction	\$	\$ 0 0	50.0 50.0
<u>69kV Transmission Line Alternatives</u>				
Yucca Alternatives	Annual Construction	0 170	0 0	0 0.08
Gila Alternatives	Annual Construction	200 600	700 100	0.29 0.06
North Gila Alternatives	Annual Construction	1,400 5,700	5,800 1,700	2.17 7.67
Dome Valley Alternatives	Annual Construction	900 4,200	4,500 1,400	1.69 4.85
<u>161kV Transmission Line Alternatives</u>				
Alternative D-2, B-D	Annual Construction	200 10,600	900 2,500	0.38 10.82
Alternative B-2, B-D	Annual Construction	100 10,600	500 2,800	0.22 10.23

* The expansion of the Yucca Substation would require the removal of 50 acres of agricultural land. As the land would be purchased outright by the utility and taken out of production, no estimate of cost of crop loss was made.

Source: Wirth Associates, Inc. February 1981. (Derived from information provided by Resources International.)

V

FIGURES

APS/SDG&E INTERCONNECTION PROJECT Phase II Environmental Studies-SDES

CLEVELAND
NATIONAL
FOREST

147

145d

146b

145c

156
145b

158

157

155

145a

144

20

94

146a

5

10

CALIFORNIA

MEXICO

**GEOTECHNICAL FEATURES
RESIDUAL IMPACT LEVELS**

- High Impact
- Moderate Impact
- Low Impact
- No Identifiable Impact

prepared by:

WIRTH ASSOCIATES



Figure 5-2(A)

APS/SDG&E INTERCONNECTION PROJECT Phase II Environmental Studies-SDES

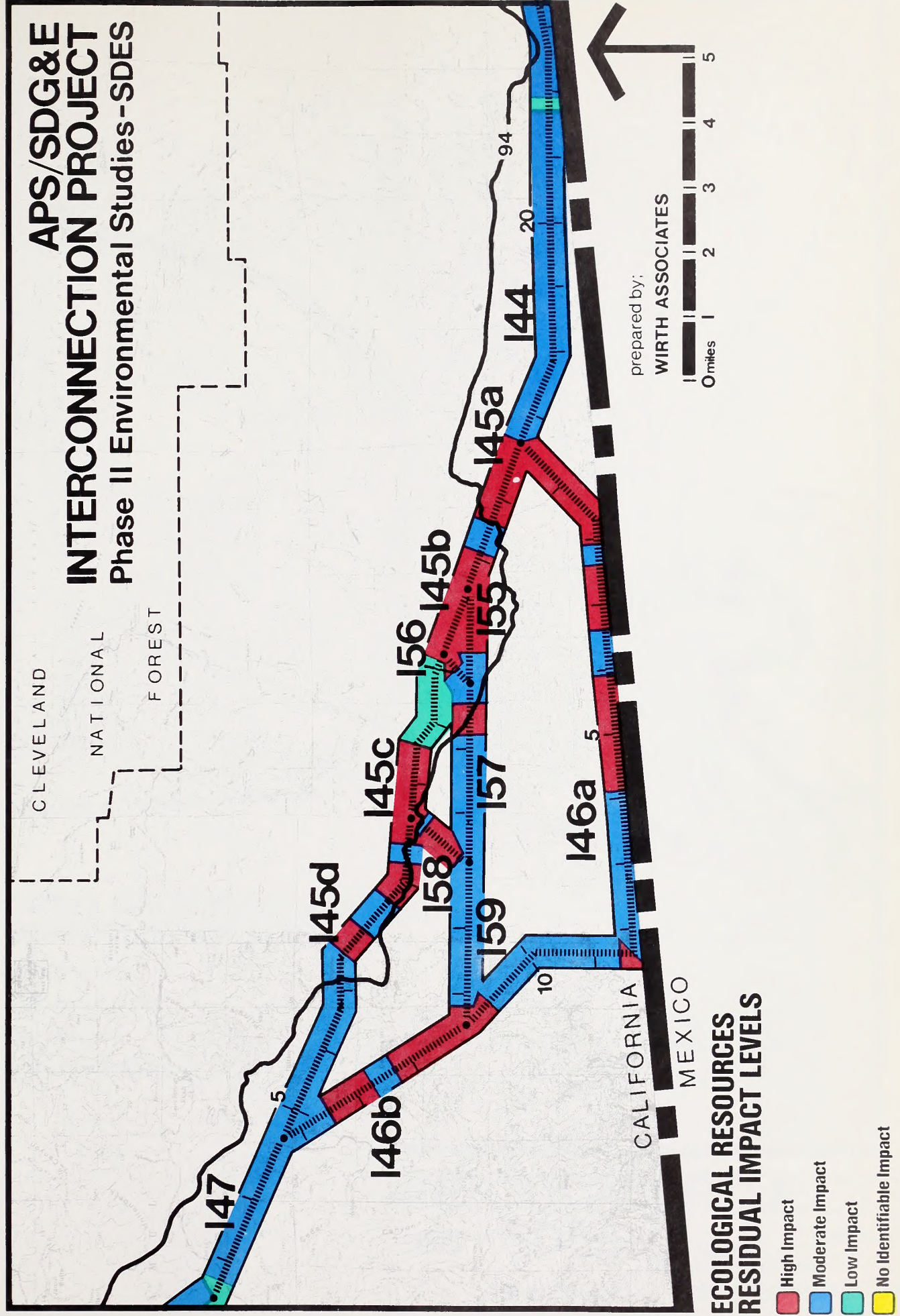


Figure 5-3(A)

APS/SDG&E INTERCONNECTION PROJECT Phase II Environmental Studies-SDES

CLEVELAND
NATIONAL
FOREST

147

5

145d

146b

145c

156

158

157

145b

159

155

145a

144

20

94

10

146a

5

CALIFORNIA

MEXICO

**SOCIAL AND ECONOMIC LAND USES
RESIDUAL IMPACT LEVELS**

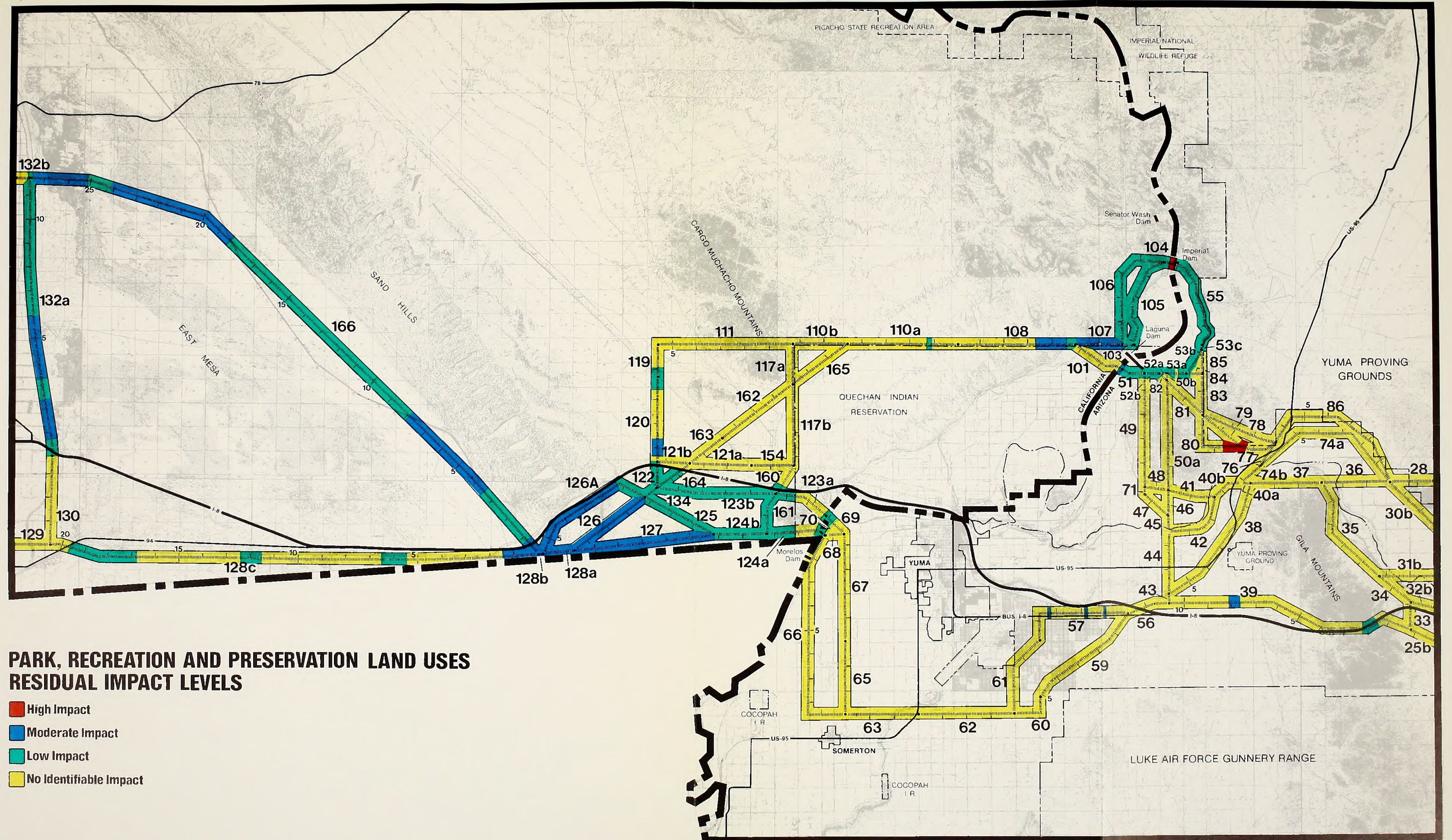
- High Impact
- Moderate Impact
- Low Impact
- No Identifiable Impact

prepared by:

WIRTH ASSOCIATES

0 miles 1 2 3 4 5

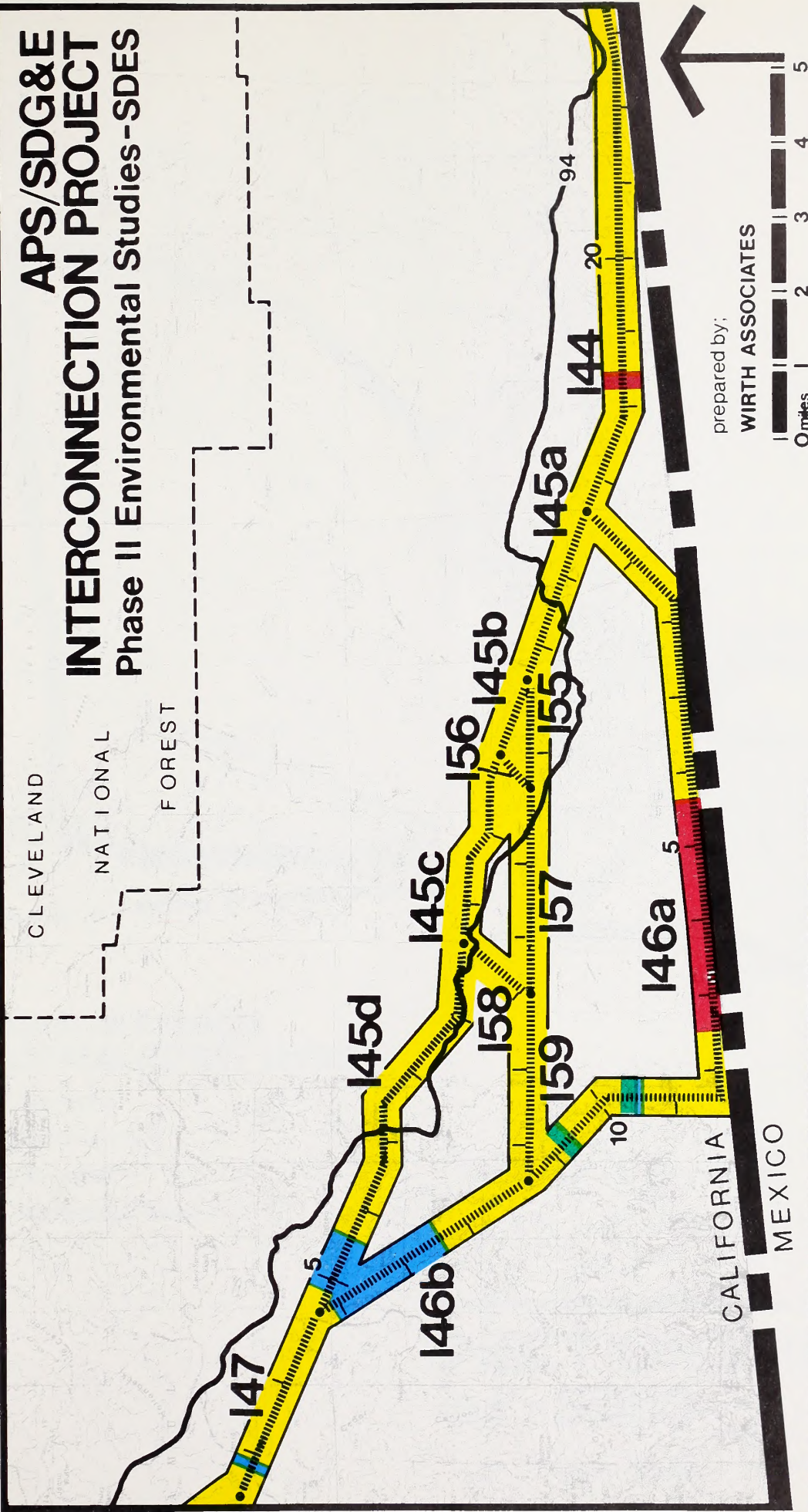
Figure 5-4(A)



APS/SDG&E INTERCONNECTION PROJECT Phase II Environmental Studies - SDES

Figure 5-5(A)

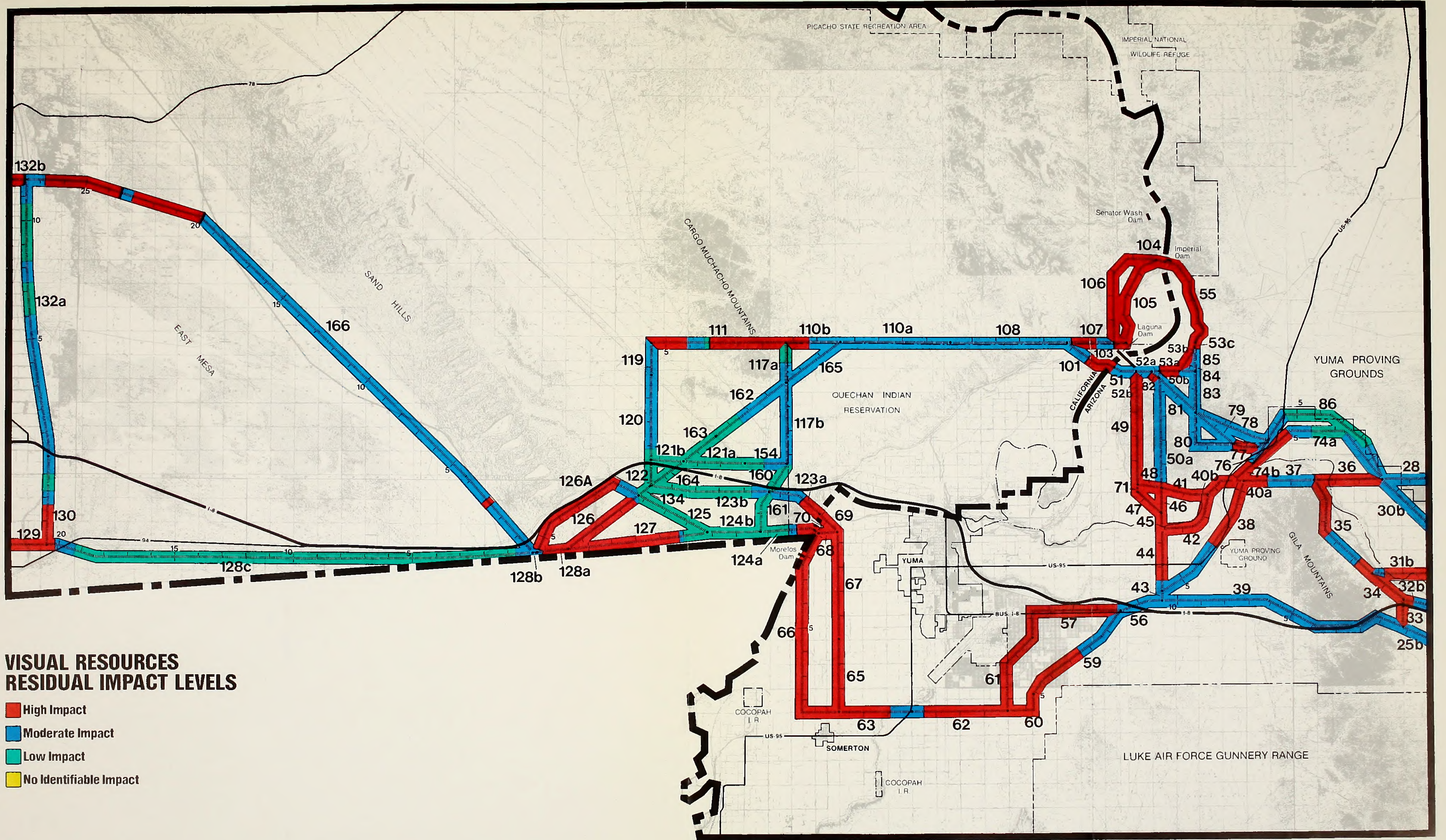
APS/SDG&E INTERCONNECTION PROJECT Phase II Environmental Studies-SDES



**PARK, RECREATION AND PRESERVATION LAND USES
RESIDUAL IMPACT LEVELS**

No Identifiable Impact

Figure 5-5(A)



VISUAL RESOURCES RESIDUAL IMPACT LEVELS

- High Impact
- Moderate Impact
- Low Impact
- No Identifiable Impact

APS/SDG&E INTERCONNECTION PROJECT Phase II Environmental Studies - SDES

Figure 5-6(A)

prepared by:
WIRTH ASSOCIATES

0 1 2 3 4 5 Miles

APS/SDG&E INTERCONNECTION PROJECT Phase II Environmental Studies-SDES

CLEVELAND
NATIONAL
FOREST

I47

5

I45d

I46b

I45c

I58

I59

10

I56

I45b

I55

I45a

I44

20

94

I46a

5

CALIFORNIA

MEXICO

**VISUAL RESOURCES
RESIDUAL IMPACT LEVELS**

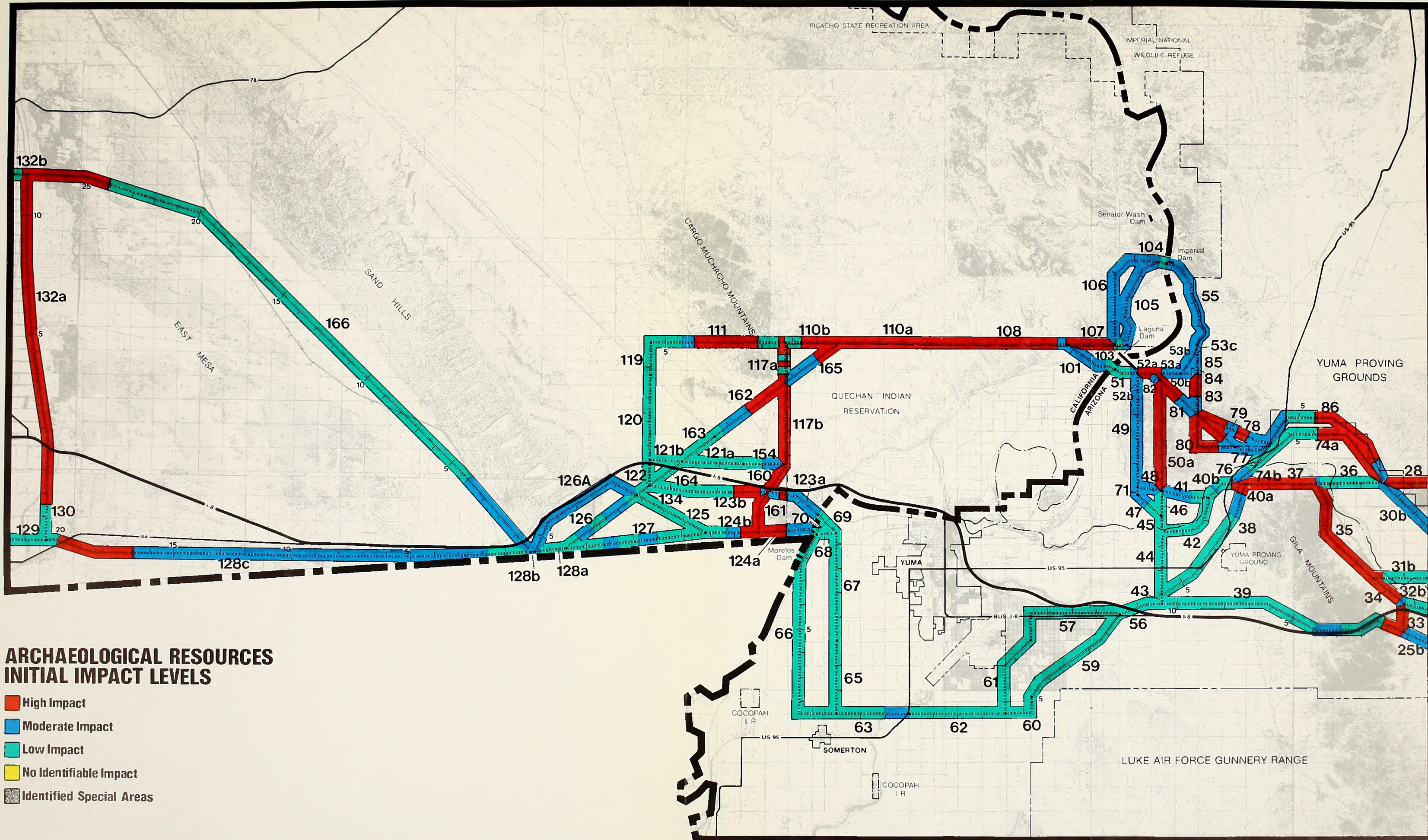
- High Impact
- Moderate Impact
- Low Impact
- No Identifiable Impact

prepared by;

WIRTH ASSOCIATES

0 miles 1 2 3 4 5

Figure 5-6(A)



ARCHAEOLOGICAL RESOURCES INITIAL IMPACT LEVELS

- High Impact
- Moderate Impact
- Low Impact
- No Identifiable Impact
- Identified Special Areas

APS/SDG&E INTERCONNECTION PROJECT Phase II Environmental Studies - SDES

Figure 5-7(A)

APS/SDG&E INTERCONNECTION PROJECT Phase II Environmental Studies-SDES

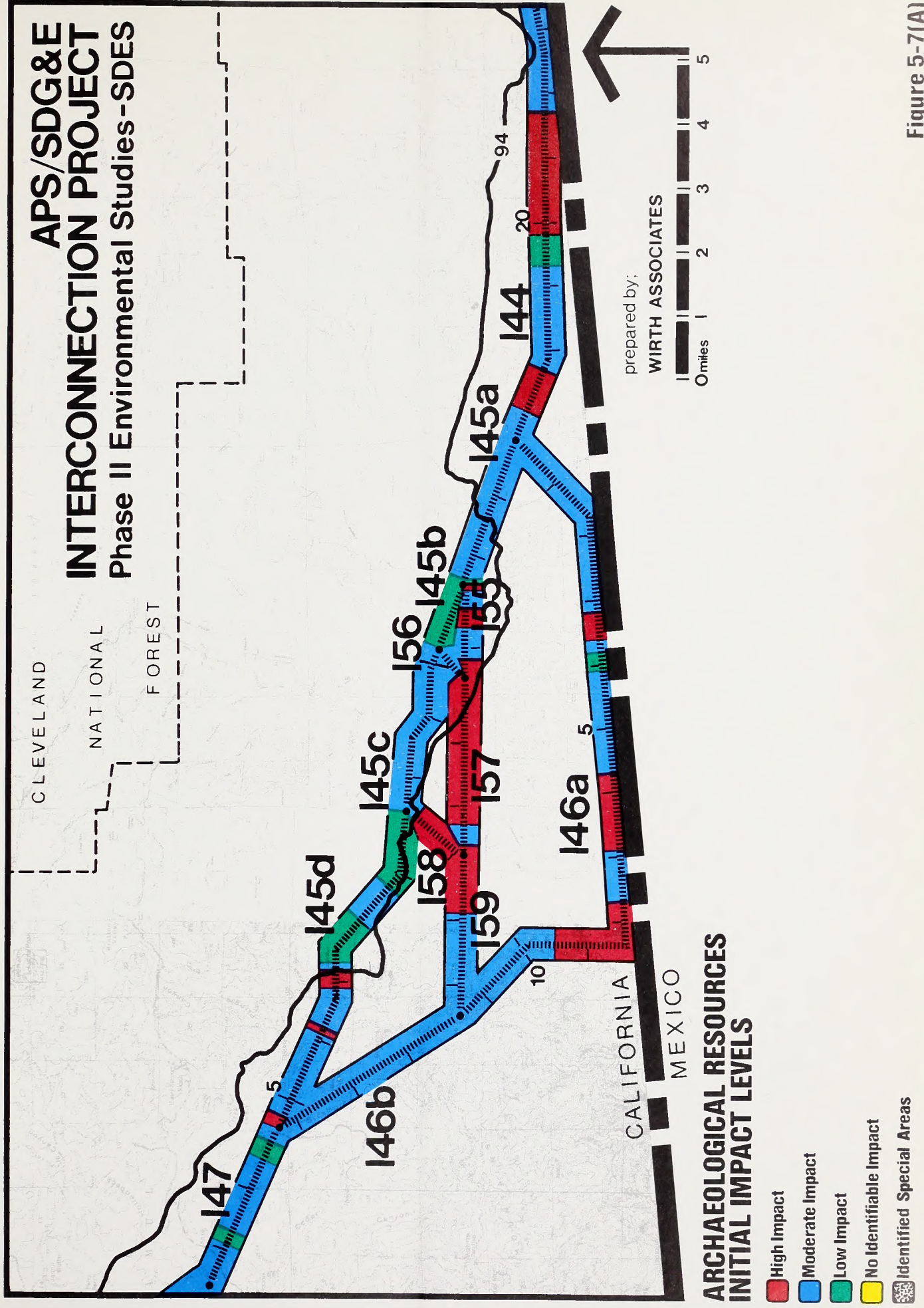
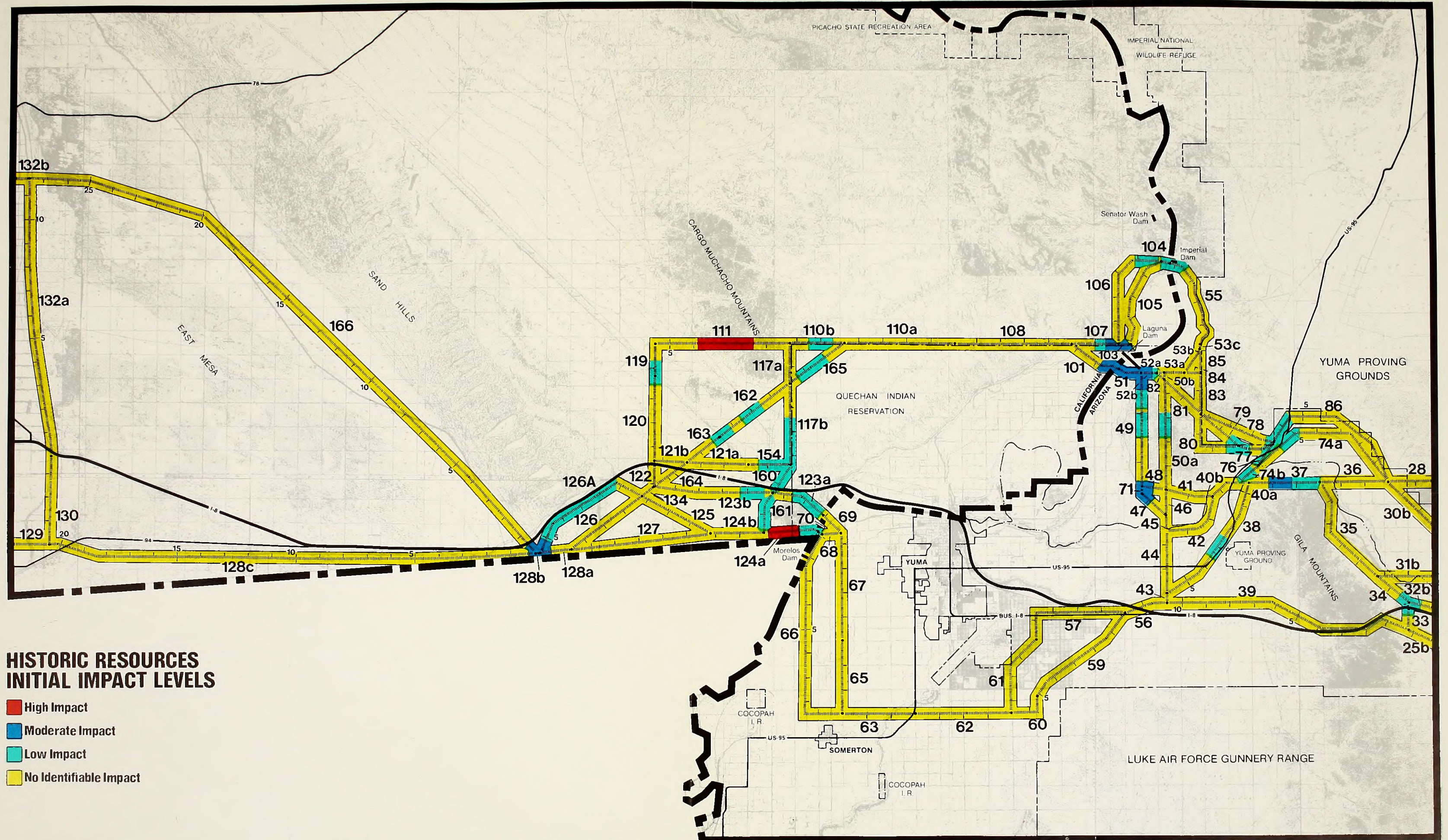


Figure 5-7(A)



APS/SDG&E INTERCONNECTION PROJECT Phase II Environmental Studies - SDES

Figure 5-8(A)

APS/SDG&E INTERCONNECTION PROJECT Phase II Environmental Studies-SDES

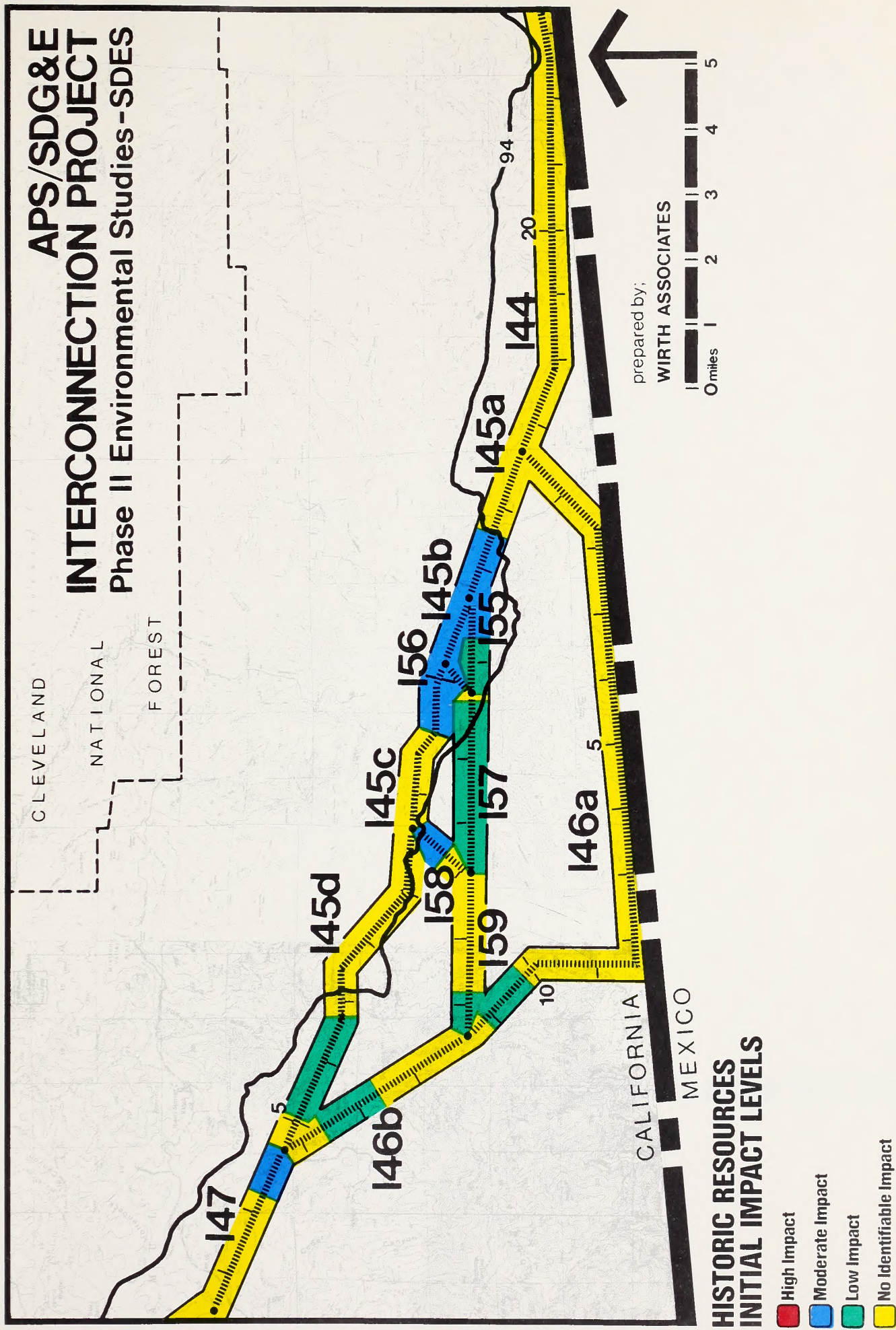


Figure 5-8(A)

CHAPTER 6 - LIST OF PREPARERS AND CONTRIBUTORS

N.B. This chapter is a supplement to Chapter 6 in the DES.

The preparers and contributors of this supplement remain the same as those of the DES with the addition of the contributors listed below.

Name: S. Cooper

Association: Wirth Associates, Inc.

EIS Assignment: Report Production

Education: Kinman Business University, Spokane, Washington
Arizona State University, Tempe

Experience: Extensive experience in supervising clerical staff, scheduling, coordinating report production, cataloging library materials, editing and proofing for several major projects.

Name: D. E. James

Association: Wirth Associates, Inc.

EIS Assignment: Land Use and Visual Studies

Education: M.S. Candidate, Rural Town and Regional Planning, University of Montana
B.S., Geographical Planning, University of Utah, 1975

Experience: Land-use study coordinator for a 230kV transmission-line siting study in Metropolitan Phoenix for APS involving inventory and data collection for the computerized route-evaluation model and report preparation. Study-team member for a 230kV receiving station and transmission-line siting study for Salt River Project involving development of a sensitivity-testing workshop, formulation of a computerized sensitivity-model and report preparation.

Name: R. C. Kingery

Association: Wirth Associates, Inc.

EIS Assignment: Ancillary Facilities Land-Use Study

Education: M.S., Urban Planning, University of Arizona
Bachelor of Fine Arts, University of Illinois

Experience: Project manager for two urban transmission-line siting studies in Arizona involved in concept development, public presentations, report and testimony preparation. Project manager for environmental siting studies for office/communication center for a Phoenix utility. Land use planner with Arizona Office of Economic Planning and Development and for Maricopa County Planning and Zoning Department.

Name: R. Mattson

Association: Wirth Associates, Inc.

EIS Assignment: Design and Graphics

Education: Black Hills State College, South Dakota

Experience: Assistant manager of design and production of graphic material for numerous major projects including APS/SDG&E Interconnection Project Phase II Corridor Studies, DES, Fort Peck-Havre Transmission Line Study Area, San Diego River Project, and Deer Valley to Alexander 230kV. Also, coordination, design and production of various graphic materials, slide shows and presentation graphics associated with Wirth Associates.

Name: J. Schaefer

Association: Wirth Associates, Inc.

EIS Assignment: Historical Resources Studies

Education: Ph.D., Anthropology, University of Arizona
M.A., Anthropology, University of Arizona
B.A., The City College of New York

Experience: Principal investigator of historical resources for numerous transmission line projects in Arizona and California. Directed the fieldwork testing phase of the Marina/Columbia Development Project in San Diego. Conducted archival research and oral history program in the Santa Rita Mountains, Arizona.

Name: M. W. Schaeffer

Association: Wirth Associates, Inc.

EIS Assignment: Land Use Studies

Education: M.S., in progress, Recreation, Arizona State University
B.S., Geography, Arizona State University

Experience: Assisted in land-use study for state wide power-plant siting study. Assisted in data manipulation and gathering land ownership information for APS/SDG&E Interconnection Project transmission-line study.

Name: C. L. Smith

Association: Wirth Associates, Inc.

EIS Assignment: Data Management

Education: Post graduate studies continuing, Arizona State University
B.S., Liberal Arts, California State University, Chico

Experience: Experience in archival archaeological research, specialized in data management on major projects. Assistant project manager and data manager for Malin to Alturas cultural-resources study and Potrero 7 Phase I cultural resources study; data manager for APS/SDG&E Interconnection Project (draft EIS/EIR preparation) and Fort Peck-Havre Transmission Line Project involved in development of computer data-processing program; cultural resource inventory and archival research for Phase I Regional Studies, Phase II Corridor Studies APS/SDG&E Interconnection Project and documentation of Phase II Sundesert Nuclear Project.

Name: P. Thomas

Association: Wirth Associates, Inc.

EIS Assignment: Land Use Studies

Education: M.S. Candidate, Rural, Town and Regional Planning, University of Montana
B.S., Electronics, Northern Michigan University, Marquette, Michigan

Experience: Assisted in land-use study for urban transmission-line siting project. Involved in data collection, manipulation and analysis as well as report preparation. Also involved in land-use study for the APS/SDG&E Interconnection Project including data collection, data synthesis, and impact assessment.

**AGENCIES, ORGANIZATIONS & PERSONS TO WHOM COPIES
OF THE SUPPLEMENT TO THE DRAFT ENVIRONMENTAL DOCUMENT ARE SENT**

CHAPTER 7 - AGENCIES, ORGANIZATIONS AND PERSONS RECEIVING
A COPY OF THE SUPPLEMENT TO THE DRAFT ENVIRONMENTAL DOCUMENT

Federal

Department of Agriculture

- Agricultural Stabilization and Conservation Service
- Forest Service
- Rural Electrification Administration
- Soil Conservation Service

Department of Defense

- Army
- Air Force
- Corps of Engineers
- Navy
- Marines

Department of Commerce

Department of Energy

- Federal Energy Regulatory Commission
- Western Area Power Administration

Department of Health and Human Services

- Environmental Health Services Division
- National Institute of Environmental Health Services

Department of Justice

- U. S. Border Patrol

Department of the Interior

- Bureau of Indian Affairs
- Bureau of Land Management
- Bureau of Mines
- Fish and Wildlife Service
- Geological Survey
- Heritage Conservation and Recreation Service
- National Park Service
- National Resources Library (Washington, D.C.)
- Water and Power Resources Service

Department of State

- International Boundary and Water Commission, United States and Mexico

Department of Transportation

- Coast Guard
- Federal Aviation Administration
- Federal Highway Administration

Federal (continued)

Advisory Council on Historic Preservation
Council on Environmental Quality
Environmental Protection Agency
Federal Communications Commission
Nuclear Regulatory Commission
Superintendent of Documents
Water Resource Council

State

Arizona

Attorney General
Commission on Agriculture and
Horticulture
Commission on Arizona Environment
Corporation Commission
Department of Mineral Resources
Department of Revenue
Department of Transportation
Governor Bruce Babbitt
Indian Affairs Commission

Office of Economic Planning and Development
Outdoor Recreation Coordinating Commission
State Clearinghouse
State Game and Fish Department
State Health Department
State Historic Preservation Officer
State Land Department
State Parks Department
Water Commission

California

Air Resources Board
California Coastal Commission
Department of Conservation
Department of Boating and Waterways
Department of Fish and Game
Department of Food and Agriculture
Department of Health Services
Department of Navigation and Ocean
Development
Department of Forestry
Department of Parks and Recreation
Department of Transportation
Department of Water Resources
Division of Aeronautics
Division of Highways

Division of Mines and Geology
Energy Commission
Governor Edmund G. Brown, Jr.
Historic Landmarks Advisory Committee
State Lands Commission
Native American Heritage Commission
Office of Planning and Research
Public Utilities Commission
Regional Water Quality Control
Colorado River Board of California
State Clearinghouse
State Historic Preservation Officer
State Water Resources Control Board
Wildlife Federation Board

County

Maricopa

Board of Supervisors
Flood Control District
Health Department
Highway Department
Parks and Recreation Department
Planning Department

Yuma

Board of Supervisors
Health Department
Highway Department
Parks and Recreation Department
Planning and Zoning Department

Imperial

Board of Supervisors
Assessor
Counsel
Planning Department
Public Works Department
Parks and Recreation Department

San Diego

Board of Supervisors
Land Use and Environmental Regulation
Planning Office

City

Buckeye
Gila Bend
Somerton
San Diego
Wellton
Yuma
Chula Vista

Calexico
El Centro
Brawley
Holtville
Calipatria
Westmoreland
City of Imperial

Irrigation and Conservation Districts

Arizona Association of Conservation
Districts
Imperial Irrigation District
Roosevelt Irrigation District
Metropolitan Water District
North Gila Irrigation District
Southbay Irrigation District

Seeley Water District
Unit B Irrigation and Drainage District-Somerton
Wellton-Mohawk Irrigation and Drainage District
Yuma County Water Users Association
Yuma Irrigation District
Yuma Mesa Irrigation and Drainage District

Indian Tribes and Councils

Arizona

Ak-Chin
Cocopah
Colorado River

Fort Yuma
Gila Bend
Salt River Pima-Maricopa

California

Agua Caliente
Barona
Campo
Cuyapaipe
Inaja
Kumeyaay
La Jolla
Los Coyotes

Manzanita
Mesa Grande
Pala
Pauma and Yuima
Rincon
San Pasqual
Santa Ysabel
Sycuan

Educational Institutions

Arizona State University
Butler University
Colorado State University
Indiana University
Maricopa County Community College
Northwestern University

Oregon State University
San Diego State University
University of Arizona
University of California
University of Wisconsin

Libraries and Museums

Arizona

Arizona Department of Library and
Archives
Arizona State Museum
Arizona State University
Avondale City Library
Colorado River Indian Tribes Indian
Library
Desert Foothills Library
Grand Canyon College Library

Northern Arizona University College Library
Mesa Public Library
Phoenix College Library
Phoenix Public Library
Scottsdale Public Library
Sun City Library
University of Arizona College Library
Yuma City - County Library

Libraries and Museums (continued)

California

Brawley City Library
Campo Morena Village Branch
Library - Campo
Castle Park Branch - Chula Vista
City of Riverside Library
East San Diego Branch Library
El Cajon City Library
El Centro Public Library
Imperial City Library
Imperial Valley College Museum
Imperial Valley County Library
Jacumba Branch Library
Lakeside Library

La Mesa Library
Meyer Memorial Library - Calipatria
Natural History Museum - San Diego
Otay Mesa Branch Library
Potrero Branch Library - Campo
San Diego City Library
San Diego County Library
San Diego County Library of Fletcher
Hills - El Cajon
San Diego Museum of Man
Santee Branch Library
Spring Valley Branch Library -
Spring Valley

Conservation Groups

Arizona Conservation Council
Animal Defense Council
Arizona Desert Bighorn Sheep Society
Arizona Nature Conservancy
Arizona Wilderness Coalition
Arizona Wildlife Federation
Audubon Society
California Conservation Council
California Desert Conservation Area
Advisory Committee
California Native Plant Society
California Natural Areas Coordinating
Council
California Wildlife Federation
Citizens Coordinate, Century Three
Coachella Valley Wild Game
Propagation Club
Conservation Call
Defenders of Wildlife
Desert Watch
Ecology Centre

Friends of Animals
Friends of the Earth
Izaak Walton League
Mearns Wildlife Society
Mountain Defense League
National Hikers and Campers Association
National Wildlife Federation
Natural Resources Defense Council
Nature Conservancy
San Diego County Wildlife Federation
San Diego Historical Society
San Diego Voice of Energy
Sierra Club
Society for California Archeology
Southern Arizona Environmental Council
Southern California Council of Conservation Clubs
Wilderness Society
Wildlife Management Institute
Wildlife Society
Yuma Archeological Society
Yuma Women's Reel and Rifle Club

State Legislators

Arizona

Representative Morris Courtright
Representative Bob Denny
Representative Jim Hartdegen
Representative Renz D. Jenkins
Representative Frank McElhaney
Senator Polly Getzwiller
Senator Jones Osborn
Senator S. J. Hal Runyan

California

Assemblyman Walter Ingalls
Assemblyman Dave Kelley
Senator William A. Craven
Senator Robert B. Presley

Congressional Representatives

Arizona

Senator Dennis D. DeConcini
Senator Barry Goldwater
Representative John J. Rhodes
Representative Robert Stump
Representative Morris K. Udall

California

Senator Alan Cranston
Senator S. I. Hayakawa
Representative George E. Brown
Representative Clair Burgener

User Groups

Arizona Agricultural Aircraft
Association
Arizona Agricultural Applicators
Arizona Cattle Growers Association
Arizona Mining Association
Arizona Public Service Company
Arizona Small Mine Operators
Association
Arizona State Association Four-Wheel
Drive Clubs
Arizona Telephone Company
Benham, Blair & Affiliates
California Agricultural Aircraft
Association
California Association of FourWheel
Drive Clubs
Central Brave Ag Services
City Service Company
Connell, Metcalf & Eddy
Creepy Crawlers FourWheel Drive
Clubs

Dames and Moore
D.S. Dusters
Energy Impact Associates
Environmental Impact Services
Frontier Agricultural Service
Farm-Air Services
El Paso Natural Gas Company
Henningson Durham & Richardson
Imperial County Desert Users Group
Joe Maggio, Inc.
Johannessen & Girand
Los Angeles Department of Water and Power
Leva, Hawes, Symington, Martin & Oppeaheimer
Mar Aviation
National Campers and Hikers Association
Oil and Gas Association of Arizona
ORV Monitor
Pacific Gas and Electric Company
Paine Aero Services
Producers Livestock Marketing Association
Provident Holding Company

User Groups (continued)

Public Service Company of Albuquerque	Stoker Company
R.B. Wilson, Company	Texas Electric Service Company
RECON	Tucson Electric Company
N.J. Reibe Enterprises	Union Minerals
Republic Geothermal, Inc.	Val-Air Company
Rio Verde Helicopters	Visco Flying Company
Ross Flying Service	V-Wolder Associates
Salt River Project	Western Farm Management Association
Southern California Edison Company	Western Realty Company
Southern California Gas Company	Western Rockhounds Association
Southern Pacific Transportation Company	

Public Interest Groups

American Association of University Women	Imperial County Farm Bureau
Arizona Chapter SCSA	Jacumba Volunteer Fire Department
Arizona Farm Bureau Federation	Jamul/Dulzura Planning Group
Arizona Natural Resources Conservation Districts	League of Arizona Cities and Towns
Arizona State Historical Society	League of Women Voters
Atomic Industrial Forum	Maricopa Association of Governments
California Indian Legal Services	National Parks and Conservation Association
Colorado River Planning Office	National Association of Conservation Districts
Community Energy Action Network	National Council of Public Land Users
Community & Rural Development- Concerned for the Quality of Life	Planning and Conservation League
Comprehensive Planning Organization	San Diego County Archaeological Society
Conference of California Historical Societies	San Diego Voice of Energy
District 4 Council of Governments	Serena Road Committee
Eucalyptus Hills Landowners Association	Southern California Association of Governments
	Sunrise Lodge Institute
	Yuma County Chamber of Commerce
	Yuma County Farm Bureau
	Yuma 500kV Transmission Line Relocation Committee

Newspapers

Arizona

Arizona Daily Star	United Press International
Arizona Republic	Valley & Foothills News
Associated Press	Valley News
Buckeye Valley News	Yuma Daily Sun
Phoenix Gazette	

Newspapers (continued)

California

Back Country Trader
Brawley News
Chula Vista Star News
Daily Californian
El Cajon Daily Californian

Evening Tribune
Holtsville Tribune
Imperial Valley Press
San Diego Union
Times Advocate

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APPENDIX A - BIBLIOGRAPHY

I Chapters 1 and 3 are based on some information provided by the Applicants, APS and SDG&E, and the CPUC.

II References for Chapter 2 are cited in Appendix A of the DES. Additional references are as follows:

Wirth Associates, Inc. April 1981. APS/SDG&E Interconnection Project Environmental Study, Phase II Corridor Studies - Addendum.

Wirth Associates, Inc. April 1981. APS/SDG&E Interconnection Project Environmental Study, Ancillary Facility Studies - Addendum.

Wirth Associates, Inc. April 1981. APS/SDG&E Interconnection Project Environmental Study, Feasibility/Suitability Studies - Addendum.

III Some information in Chapter 3 for the section on Alternatives including the Proposed Action was provided by APS, SDG&E and CPUC. Ensuing sections of Chapter 3, Chapter 4 and Chapter 5 are based on the APS/SDG&E Interconnection Project Environmental Study, Phase II Corridor Studies cited in Appendix A of the DES. A complete compilation of Phase II references was bound in a separate volume, copies of which are available for public inspection at the following offices:

BLM - Arizona State Office, Phoenix, Arizona
Phoenix State Office, Phoenix, Arizona
Yuma District Office, Yuma, Arizona
California State Office, Sacramento, California
El Centro Area Office, El Centro, California
California Desert District (formerly Riverside District)
Riverside, California

CPUC - San Francisco, California

Source documents for the additional studies include the following:

Wirth Associates, Inc. August 1980. APS/SDG&E Interconnection Project Environmental Study, Phase II Corridor Studies.

_____. April 1981. APS/SDG&E Interconnection Project Environmental Study, Phase II Corridor Studies - Addendum.

_____. August 1980. APS/SDG&E Interconnection Project Environmental Study, Ancillary Facility Studies.

_____. April 1981. APS/SDG&E Interconnection Project Environmental Study, Ancillary Facility Studies - Addendum.

Wirth Associates, Inc. August 1980. APS/SDG&E Interconnection
Project Environmental Study, Feasibility/Suitability Studies.

_____. April 1981. APS/SDG&E Interconnection Project Environmental
Study, Feasibility/Suitability Studies - Addendum.

APPENDIX G
SUPPLEMENTARY DATA FOR THE ROUTE SELECTION PROCESS
DES and SDES

APPENDIX G

SUPPLEMENTARY DATA FOR THE ROUTE-SELECTION PROCESS DES and SDES

INTRODUCTION

To simplify the presentation of the route-selection process, a detailed explanation of why routes were eliminated was excluded from Chapter 3. The rationale for specific SDES route elimination is therefore described below, and pertains to alternative routes in the Yuma, Sand Hills, Imperial Valley, Dulzura and Miguel-Mission Tap areas. Route elimination was determined in some cases from SDES Phase II studies or feasibility/suitability studies, and in others by reevaluation of DES Phase II or feasibility/suitability studies.

DES Tables 3-9, Environmental Consequences and 5-3, Locations of Selectively Committed Mitigation, follow the section on Route Elimination and have been included to facilitate review of the SDES.

It is important to note that since all Phase II links were studied in equal detail, any of the Phase II links that were eliminated may be reinstated during the decision-making process.

ROUTE-ELIMINATION RATIONALE

YUMA ALTERNATIVES

Once the decision was made to supplement the Draft Environmental Document (DES), a series of alternative 500kV routes were evaluated at a Phase II level (corridor scale) in the Yuma area for both California and Arizona. The alternatives in Arizona, designated to avoid agricultural land (e.g., Link 86), were delineated across and adjacent to the Yuma Proving Ground (Links 77 through 85). The new links coupled with the addition of three alternative substation sites (Gila, North Gila and Dome Valley), associated 69kV systems from the four alternative substation sites, and the addition of previously eliminated links (across the Laguna and Imperial dams) resulted in an extremely complex alternative routing network.

As a result of the Arizona alternatives, renegotiations were undertaken with the Fort Yuma (Quechan) Indian Reservation to allow alternative routes studies (Links 101 and 165) to cross the reservation. Other alternatives (Links 162, 163 and 164) were added to provide northern routing comparisons.

Phase II Studies - Yuma

In order to reduce the large number of potential routing alternatives (studied at a Phase II level) in the Yuma area (and the amount of data necessary for decision making) to a smaller number of environmentally acceptable routes, a series of "comparisons" or decision-making points were identified. For example, Comparison B (Links 77, 78, 79 and 80) was made for three alternative routes (a subset) so that subsequent connection of other routes to this subset would have only the environmentally preferred route (of the subset) to consider. A total of 14 subset comparisons were made. In total, 34 links were eliminated in the Yuma area and the remaining links combined to form six final comparison routes. The following documents the environmental issues and the significant unavoidable adverse impacts associated with the alternative routes (within each subset) and identifies (indicated with an asterisk) the environmentally preferred route of each subset.

Comparison A

Route 1)	Links 74a, 74b
*Route 2)	Links 36, 37, 40a
Route 3)	Links 86, 76, 74b

Links 36, 37 and 40a are environmentally preferred because of slightly less impacts to ecological, archaeological and Native American resources than Routes 1 and 3. While Links 36, 37 and 40a have the greatest impact to agricultural and visual resources, only 0.62 acre (approximately) of agricultural lands would be removed from production by this alignment.

Comparison B

*Route 1)	Link 78
Route 2)	Links 77, 79
Route 3)	Links 77, 80

Link 78 is preferred because of less impact to parks, visual, archaeological and Native American resources. Link 77 crosses the N.R. Adair Park, resulting in high physical and visual impacts. Slightly greater impact to soils and ecological resources would result from this alignment.

Comparison C

Route 1)	Links 83, 84, 53a, 52a
*Route 2)	Links 81, 82

Links 81 and 82 avoid the Mittry Lake area and impacts to visual, recreation, archaeological and ecological resources. Links 83, 84 and 53a would create an unmitigable waterfowl-collision hazard.

Comparison D

- *Route 1) Links 48, 49
- Route 2) Links 50a, 50b, 52a, 52b

Although Links 48 and 49 would have the highest visual impacts, they are preferable for ecological and archaeological resources. High impacts to archaeological resources are predicted for the entire length of Links 50a, 50b, 52a and 52b.

Comparison E

- *Route 1) Links 48, 49, 52a, 52b
- Route 2) Links 50a, 50b

Although Links 48, 49, 52a and 52b would have the highest visual impacts, they are preferable for ecological and archaeological resources. High impacts to archaeological resources for the entire length of Links 50a and 50b are predicted.

Comparison F

- Route 1) Links 105, 103
- *Route 2) Link 106

Impacts to ecological and Native American resources on Link 106 would be less than on Links 105 and 103. Only slight differences exist between the alternative alignments for all other resources.

Comparison G

- *Route 1) Links 36, 37, 40a, 40b, 41, 48, 49, 51, 101
- Route 2) Links 36, 37, 40a, 40b, 41, 50a, 50b, 53a, 53b, 53c, 55, 104, 106, 107

Route 1 is the preferred alignment. The Laguna Dam alternative (Route 1) avoids the Mittry Lake Wildlife Refuge (and therefore significant unmitigable waterfowl-collision hazards) and substantially reduces the amount the endangered species habitat crossed. Route 1 is also preferred for archaeological and visual resources. The Route 2 "loop" is the worst route in the Project for ecological resources. Route 2, however, is the preferred route for agricultural resources because of the potential for removing only 0.62 acre of agricultural land from production.

Comparison H

- *Route 1) Links 86, 78, 81, 82, 52b, 51, 101
- Route 2) Links 86, 78, 83, 85, 53c, 55, 104, 106, 107

Route 1 is the preferred alignment as it avoids significant impacts to ecological, visual and archaeological resources. Route 2, however, is the preferred alignment for agricultural resources (see Comparison G).

Comparison I

- Route 1) Links 36, 37, 40a, 40b, 41, 48, 49, 51, 101
- *Route 2) Links 51, 52b, 78, 81, 82, 86, 101

Route 2 is preferred. Route 2 crosses 0.6 mile of agricultural land, removing 0.44 acre, while Route 1 crosses 1.96 miles, removing 1.06 acres. Route 2 has less impact to the visual resources and socioeconomic land use. Route 1 is preferred for ecological and archaeological resources.

Comparison J

- *Route 1) Links 46, 48
- Route 2) Links 47, 71

Links 46 and 48 are preferred for visual and historic resources and socioeconomic land use. Links 47 and 71 have only slightly less impact to agricultural resources.

Comparison K

- Route 1) Links 110b, 117a
- *Route 2) Links 165

Link 165 avoids major impacts to Native American resources and is also preferred for archaeological, visual and ecological resources.

Comparison L

- Route 1) Links 117b, 154, 121a
- *Route 2) Links 162, 163

Potential impacts to Native American, archaeological and visual resources would be minimized by Links 162 and 163. Links 162 and 163 would cause less soil disturbance than the other alternative route.

Comparison M

*Route 1)	Link 164
Route 2)	Links 121b, 122

Link 164 has fewer impacts to all resources, particularly ecological resources.

Comparison N

Route 1)	Links 161, 124b, 125
*Route 2)	Links 123b, 134

Links 123b and 134 avoid significant impacts to archaeological and Native American resources on Link 161.

Comparison O

*Route 1)	Links 165, 162, 163, 164, 134
Route 2)	Links 110b, 111, 119, 120, 122, 134
Route 3)	Links 165, 117b, 160, 123b, 134

Route 1 has less impact to ecological, archaeological and Native American than either of the two alternative routes. Route 2 would have significant impact upon historic resources.

SAND HILLS ALTERNATIVE

SDES Feasibility/Suitability - Northern Sand Hills Alternative

The Northern Sand Hills Alternative Corridor Study investigated the feasibility of a northerly crossing of the Algodones Sand Dunes south of Highway 78. The Northern Sand Hills Alternative was identified because of objections to the environmentally preferred route identified in the DES. A suggestion was made in the public hearings (at El Centro on October 6, 1980) that potential routing opportunities due east of the Keystone Route should be investigated.

Review of environmental and engineering data failed to identify any areas that would prohibit (render infeasible) a northerly crossing of the Sand Hills based on legal, jurisdictional, environmental or engineering rationale. The environmental suitability evaluation consisted of determining the potential impacts of the Northern Sand Hills Alternative (see Figure 2-4(R)) as compared to the East Mesa Route (Links 134, 126A, 128b and 166). The evaluation focused on the potential impacts to park, preservation and recreation land uses, visual resources and ecological resources, since no significant differences on resource sensitivities or impacts were identified for other resources along either route.

A 500kV transmission line using the Northern Sand Hills Alternative would have significantly higher impacts than the East Mesa Route on all three resources. The Northern Sand Hills Alternative would cross approximately 10 miles of recreational land-uses in the Sand Hills area and would significantly disrupt recreational opportunities. The East Mesa Route (Link 126A) crosses the Sand Hills for nearly 6.0 miles paralleling existing transmission lines (designated by the BLM as a recommended utility corridor). The existing utility corridor associated with Link 126A substantially reduces the level of impact a new 500kV transmission line would have on the visual resource. Also, the existing ground disturbance associated with the Link 126A has reduced overall habitat quality to moderate-to-low, thus making Link 126A more suitable as a transmission-line corridor for ecological resources.

In summary, the Northern Sand Hills Alternative would be significantly less suitable for the construction and operation of a 500kV transmission line due to impacts on recreational land uses, visual resources and ecological resources.

IMPERIAL VALLEY ALTERNATIVES

Phase II Studies - East Mesa

An East Mesa crossing (Link 166) was studied at a Phase II level and compared to Links 128c, 130 and 132a before being eliminated. In order to facilitate comparison of the two routes, Links 128 and 132 were divided into segments a, b and c (e.g., 128c, 132a).

Comparison P

Route 1)	Link 166
*Route 2)	Links 128c, 130, 132a

Route 2 is preferred for geotechnical, ecological and visual resources; park, preservation and recreation land-use; and historical and Native American cultural resources. Route 1 is preferred for archaeological resources and social and economic land use.

Route 2 crosses 12.3 miles of an area identified by BLM as having "very high" archaeological sensitivity and would highly impact two single-family dwellings. Route 1 - although crossing only 1.5 miles of the same sensitive archaeological area - would cross six miles of a BLM-ACEC that is flat-tailed horned lizard habitat in addition to crossing the Plank Road (another BLM-ACEC), and would be visible (within one-quarter mile) from two Native American sites.

Holtville Drain

A new alignment of Link 132 within or adjacent to the Holtville Drain was evaluated to determine the potential reduction in agricultural impact. Project design and tower location were identified by SDG&E and reviewed by IID.

It was assumed that the proposed new alignment would take 29 towers out of agricultural areas between milepost 14.0 and 21.1 on Link 132. Even though two towers could be built partially outside cropland between milepost 21.1 and 21.6, the need to build an in-crop road (to circumvent the tower base with some of the larger farm equipment) would nullify any reduction in the impact to agriculture that might occur. In addition, the towers and lines would still present an impact to agricultural aircraft operations over a distance of about six miles along the Holtville Drain.

The total costs of short-term and capitalized annual long-term impacts for Link 132, using the new alignment, are \$131,600 (for steel lattice tower). These costs are 26 percent lower than those costs calculated for the initial Link 132 alignment. The annual loss of cropping area would be reduced from 7.43 acres to 4.65 acres for the steel lattice tower.

The dollar impact of steel lattice towers to agriculture is \$800 higher on the preferred route (Link 129) than the route combining Links 132 and 136. The estimated annual loss of crop area for the steel lattice tower is 20 percent higher on Links 132 and 136 than on Link 129, or 12.14 acres and 10.14 acres respectively. The increased annual crop loss is primarily due to the diagonal crossing of agricultural land by Link 136. The diagonal crossing of Link 136 also increases the concern for safety of agricultural aircraft operators.

Links 132 and 136 have five less towers in agricultural cropland than Link 129; however, Links 132 and 136 have 24 more towers, which may impact agricultural aircraft operations.

In ranking the alternative transmission-line corridor segments across the Imperial Valley, the link combination 132 and 135 still ranks number one as causing the least agricultural impact, and Links 132 and 136, and Link 129 rank as the second choices. Because of these results, no additional studies were justified; therefore, this alignment was eliminated from further consideration.

Reevaluation of DES Alternatives

DES Feasibility/Suitability Routes

Three feasibility/suitability routes were evaluated and subsequently eliminated in the DES: the International Border Alternative, the Salton Sea Alternative and the Banning Pass Alternative (see pages 3-27 to 3-29 in the DES). Based on public response to the DES, these alternatives avoiding the Imperial Valley

were reevaluated and again eliminated from further consideration because of the constraints previously identified in the DES.

Palo-Verde Devers

A routing alternative that would parallel the Palo Verde-to-Devers route was previously considered in the DES (page 3-26). Because of responses received, the alternative was reevaluated and again failed to meet APS's project need for an interconnection in Yuma.

Median Strip of I-8

Representatives of Imperial Valley suggested that the transmission line utilize a portion of the Interstate 8 right-of-way between Plaster City and Holtville in the Imperial Valley area. The purpose of such an alignment would be to reduce potential impacts on agricultural lands and consolidate environmental impacts in an existing corridor.

SDG&E subsequently submitted to the State Highway Longitudinal Encroachment Committee a request for a ruling on the feasibility of utilizing the state freeway right-of-way.

On June 15, 1979 the Longitudinal Encroachment Committee disapproved this request since the policy on encroachments allows for only short stretches of encroaching on the highway right-of-way when it is shown that locating the facility outside the right-of-way is inordinately difficult or unreasonably costly. Neither of these reasons was applicable. The committee also stated that "it is also very doubtful that the FHWA would approve even an 'overhang' encroachment of the Interstate right-of-way."

Mesquite Lake - Substation Site

Numerous substation sites were initially evaluated in the Imperial Valley including sites on East and West Mesa and in the Central Valley including the Mesquite Lake site. The major reason the Mesquite Lake site was not one of the final alternative substation sites evaluated was because of the potential removal of approximately 50 acres of potential agricultural land. A substation at Mesquite Lake would result in a significant unavoidable adverse impact removing three to four times as much agricultural land as a 500kV transmission line through the middle of Imperial Valley. Thus, the final substations considered completely avoid agricultural land.

DULZURA ALTERNATIVES

A feasibility/suitability study was conducted in the Dulzura area for the Otay International Border Alternative Route.

Otay International Border Alternative

The Otay International Border Alternative Study investigated the feasibility of utilizing a section of the International Border from Link 146 (milepost 8.4) west to Otay Mesa and then north to interconnect Miguel Substation. The Otay International Border Alternative was suggested by residents of the Dulzura area as a way to avoid impacts to residential land-uses.

Review of environmental and engineering data resulted in the identification of several areas along the Otay International Border Alternative considered to be infeasible for, or incompatible with, the proposed 500kV transmission line: WSA CA-060-029, Otay Mountain Potential California State Preservation Area, Otay National Cooperative Land and Wildlife Management Area, Otay Mountain California Natural Area and the Coochama Experimental Forest (crossed by Link 146). The use of the above-mentioned lands for a 500kV transmission line corridor is inconsistent with current management plans and policies of various jurisdictions and the Project requirements to warrant further consideration.

MIGUEL TO MISSION TAP ALTERNATIVES

Once the Miguel Substation had been identified as the terminus for the proposed 500kV transmission line, and Mission Substation as the ultimate delivery point in the SDG&E system for power transferred from the proposed 500kV line, SDG&E investigated possible locations for constructing a 230kV delivery system to connect Miguel Substation and Mission Substation. The obvious alternative was to use the existing transmission right-of-way between Miguel Substation and Mission Substation via Los Coches Substation and Mission Tap. The objective of the investigation was to determine if there were any reasonable routing alternatives to the existing 138kV transmission right-of-way between Miguel Substation and Mission Tap via Los Coches Substation (which is adequate to accommodate the proposed 230kV transmission line).

Alternatives providing for a more direct connection between Miguel Substation and Mission Tap (passing west of Los Coches) were initially reviewed and discarded because of the severe impact all such routes would have to existing residential development. As the area has dense urban development with no suitable existing utility rights-of-way, construction of a new 230kV transmission line would result in the dislocation of numerous homes and land-uses, which would be unacceptable, given the option of utilizing the existing transmission right-of-way via Los Coches where homes would not have to be removed.

Potential routings to the east of the existing Miguel-Los Coches transmission line were also discarded because of the impediments of topographic features (e.g., Mother Miguel, San Miguel and McGinty mountains), some sacred to Native Americans; conflicts with residential development and recreation land-uses; and visual and ecological concerns, all of which could be avoided or minimized by using the existing transmission right-of-way between Miguel and Los Coches.

Finally, in order to assess the relative suitability of the existing transmission right-of-way between Los Coches Substation and Mission Tap (north and west of Los Coches), two other general routing alternatives, north and south of the existing transmission route, were identified and considered.

1. A route south of the existing transmission right-of-way along the San Diego River floodway to Mission Tap.
2. A route north of the existing transmission right-of-way, generally passing through Wildcat Canyon, then west through Muth Valley (south of San Vicente Reservoir and north of Eucalyptus Hills), and joining the existing corridor east of Miramar Naval Air Station.

Routes to the north of San Vicente Reservoir are not feasible, primarily because of conflicts with existing and future or planned land-uses. Existing land-uses include the Barona Indian Reservation, the Margaret Minshell Life Estate (of which 20 acres are used for a primitive youth camp by San Diego County), intervening residential development, Sycamore Canyon Annex, and a boy's club between the San Vicente Reservoir and Highway 67. Future land-uses include development of the Margaret Minshell Life Estate as a County park.

These alternatives were eliminated for the following reasons:

1. A route utilizing the San Diego River floodway would visually impact thousands more people than a route using the existing right-of-way; directly interfere with existing uses in the river such as sand mining; result in reduced reliability of service due to the potential impact of flooding on structure stability; and be in total conflict with the long-range park and open-space development plans for the San Diego River corridor.
2. Although a route to the north of the existing transmission right-of-way is feasible, constructing a 230kV line would result in considerably more impacts to both the social and natural environment than would a line built in the existing transmission right-of-way. A line built south of San Vicente (through Muth Valley) would visually impact numerous local residents. Although there would not be as many residences in close proximity to this alternative as the existing transmission right-of-way (e.g., in the Eucalyptus Hills area), the northern area is

considerably more natural and scenic, and the visual impacts would be greater than the incremental visual difference associated with constructing a second line (230kV) adjacent to the existing 138kV line.

In addition, considerably poorer accessibility and steeper, more rugged topography associated with this alignment would result in substantially increased potential for soil erosion and scarring, and impacts to archaeological resources and numerous existing-and-planned recreation land-uses. As vegetation along the northern route is generally undisturbed and more diverse than along the existing right-of-way, construction of the line along a northern route would also increase impacts to natural ecological values.

Finally, a route through the Muth Valley would be approximately 2.5 miles longer than the existing transmission right-of-way. In addition to increased environmental impacts, the longer Muth Valley route would incur additional costs of approximately \$1,386,000.

In summary, building a second line in an existing transmission right-of-way is the only reasonable alternative to opening a new transmission-line corridor because:

1. Use of the existing right-of-way would have lower visual impacts as a result of existing transmission structures similar in size and configuration to those proposed for the 230kV line. Using the existing right-of-way would also create fewer physical impacts related to soil erosion and scarring, and to ecological and cultural resources due to the presence of access roads and other disturbances.
2. "New right-of-way" alternatives would not provide any measurable environmental savings. This is because a lack of other existing rights-of-way in the area; the presence of dense residential development south of the existing right-of-way; and the presence of natural scenic, ecological and recreational amenities; scattered residential development; and rugged topography and poor accessibility in the area north of the existing transmission right-of-way.
3. Additional costs for acquisition of a new right-of-way and facility construction would be incurred with no off-setting environmental benefits.
4. It provides an opportunity to minimize proliferation of transmission lines through joint corridor planning and the utilization of a right-of-way that was established years ago.

TABLE 3-9 ENVIRONMENTAL CONSEQUENCES

SET OR CONNECTOR	ALTERNATIVE ROUTE	LENGTH OF ROUTE	TABLE 3-9 ENVIRONMENTAL CONSEQUENCES										ESTIMATED COSTS	
			GEOTECHNICAL FEATURES	ECOLOGICAL RESOURCES	SOCIAL AND ECONOMIC LAND USES	AGRICULTURAL RESOURCES	PARK, PRESERVATION AND RECREATION LAND USES	VISUAL CHARACTERISTICS	ARCHAEOLOGICAL RESOURCES	HISTORICAL RESOURCES	NATIVE AMERICAN CULTURAL RESOURCES	AGENCY/PUBLIC COMMENTS		SUMMARY
SET I	Rt. 1 (Link 1)	49.3	M-L 3	M-L 3 Crosses 3.0 miles of special-status desert wash and upland plant habitats; crosses Gila monster habitat; and crosses possible desert tortoise habitat.	L 3 Highly impacts 2 single-family dwellings.	L-M 1 Crosses 1.5 miles, removing 0.55 acres.	N -	M 3 Area of natural scenic quality; structures contrast.	M 3 Crosses area with a high probability of encountering sites.	L 1	H 2 Crosses 2 multiple-resource areas and 1 sacred place.	El Paso Natural Gas - mitigation potentially required along gas pipeline. Arizona Game and Fish - water catchment for bighorn sheep and mule deer.	While Rt. 1 can generally be characterized as having moderate environmental consequences, several significant impacts are predicted. The route would cross 2 Native American multiple-resource areas and 1 sacred place. Potentially high impacts to archaeological resources are predicted along approximately 25% of the route. The route would traverse an area of good scenic quality; visual impact is predicted to be moderate. Three miles of special-status plant habitat would be crossed, as well as the habitat of 2 special-status wildlife species. Rt. 1 would impact 2 single-family dwellings and remove approximately one-half acre of farmland.	\$16,762,000
	Rt. 2 (Links 2, 3, 4, 6)	47.6	L-M 2	L-M 2 Crosses 10.7 miles of special-status desert wash and upland plant habitats; crosses Gila monster habitat; and crosses possible desert tortoise habitat.	L 2 Highly impacts 1 single-family dwelling.	L-M 3 Crosses 3.0 miles, removing 1.19 acres.	N -	M-L 2 Visible from Agua Caliente Road; structures contrast.	L-M 2 Crosses area with a high probability of encountering sites.	L 3	H 3 Crosses 1 multiple-resource area and 1 burial area.	So. Pacific Pipeline Co. - induced voltages. So. Pacific Transportation Co. - interference with electric and communication equipment. Sierra Club - visual integrity of Signal Mountain. Arizona Game and Fish - mule deer population and historic range.	Moderate-to-low environmental consequences are associated with Rt. 2, with the exception of high impacts to Native American and archaeological resources. Visual impact on Rt. 2 would be moderate-to-low because of potential visibility from Agua Caliente Road. Special-status vegetation and the habitats of 2 special-status wildlife species are crossed. Rt. 2 would impact 1 single-family dwelling and remove approximately 1 acre of agricultural lands.	\$15,126,000
	* Rt. 3 (Links 2, 3, 5, 6)	43.3	L-M 1	L-M 1 Crosses 10.0 miles of special-status desert wash and upland plant habitats; crosses Gila monster habitat; and crosses possible desert tortoise habitat.	L 1 Highly impacts 1 single-family dwelling.	L-M 2 Crosses 2.5 miles, removing 1.09 acres.	N -	L 1	L-M 1 Crosses area with a high probability of encountering sites.	L 3	M 1 Crosses 1 multiple-resource area and 1 sacred place.	See Set I, Rt. 2. Arizona Wildlife Federation - preferred route.	Low-to-moderate environmental consequences are predicted for Rt. 3. Significant impacts associated with this routing alternative are: 1 single-family dwelling, the removal of 1 acre of farmland, and high impacts to Native American and archaeological resources. Special-status vegetation and the habitats of 2 special-status wildlife species would be crossed. A low visual impact is predicted for Rt. 3. Rt. 3 is the environmentally preferred route within Set I.	\$13,285,000
SET II	Rt. 1 (Links 9, 12, 14)	11.3	L 1	L 1 Crosses Gila monster habitat.	M 2 Highly impacts 8 single-family dwellings and crosses 1 light industry.	L-M 2 Crosses 0.4 mile, removing 0.15 acre.	L 2	M-H 1 High visibility from residences; structures contrast.	L-M -	L 2	M 2 Crosses former and borders present general habitation area; borders contemporary Papago cemetery; visible to other prehistoric and historic sites.	Individual property owners - interference with agricultural operations and development plans. ADOT - hazards (traffic disruption) during construction and operation.	Rt. 1 would have high visibility from residences and a moderate-to-high visual impact for the length of the route. This routing alternative would potentially impact 8 single-family dwellings and remove 0.15 acre of agricultural lands. Rt. 1 would be visible from several Native American sites. Gila monster habitat is also crossed. Impacts to other resources would generally be low-to-moderate.	\$ 3,176,000
	Rt. 2 (Links 10, 13)	11.3	L-M 2	L 2 Crosses Gila monster habitat.	L 1 Highly impacts 3 single-family dwellings.	N 1	N 1	H-M 2 High visibility from residences; structures contrast.	L-M -	N 1	L 1	See Set II, Rt. 1 above. ADOT - traffic disruption during construction and possibly operation.	Rt. 2 is characterized by low or low-to-moderate environmental consequences with the exception of high-to-moderate visual impacts to residences. Three single-family dwellings would be impacted by this routing. Gila monster habitat would be crossed. Little or no significant impacts would result to other resources. Rt. 2 is the environmentally preferred route within Set II.	\$ 3,176,000
CONNECTOR A	Connector A (Links 2, 8)	38.6	L -	L-M - Crosses 5.0 miles of special-status desert wash, upland, and riparian plant habitats; crosses 6.2 miles of bighorn sheep habitat within one mile of corridor; and crosses Gila monster habitat.	L - Highly impacts 1 single-family dwelling.	L-M - Crosses 3.7 miles, removing 1.56 acres.	L -	M - Good scenic quality in Maricopa Mountains; visibility from residences; structures contrast.	M-L - Crosses adjacent to Arizona approved National Register site -Ariz. Trail.	L -	L -	See Set II, Rt. 1 above. U.S. Fish & Wildlife Service - bighorn sheep. Corps of Engineers - may recommend modification of Gillespie Dam. El Paso Natural Gas - mitigation potentially required along pipeline.	Moderate or moderate-to-low environmental consequences are associated with Connector A. Significant impacts would potentially occur to both archaeological and visual resources. The route would be adjacent to a National Register site. Connector A traverses an area of good scenic quality and would be visible to residences in the area. The route would impact 1 single-family dwelling and remove 1.5 acres of agricultural lands. Six miles of bighorn sheep habitat are within 1 mile of this route. Special-status plant and wildlife species habitat would be crossed.	\$10,846,000
CONNECTOR B	Connector B (Links 16, 19)	53.3	L-M -	L - Crosses northernmost range of Sonoran pronghorn.	L -	L-M - Crosses 2.1 miles, removing 1.09 acres.	L-M - Crosses 2 proposed National Natural Landmarks and a proposed State Natural Area.	M-H - Scenic quality (Class B) along Sentinel Plain; high visibility and structures contrast where route parallels I-8.	L -	L -	L -	ADOT - traffic disruption, visual impact on I-8. Individual property owners - interference with agricultural operations, development plans and airstrips. So. Pacific Transportation Co. - interference with communication and electronic equipment. Arizona Game and Fish - Gila River wildlife habitats. WMID - 2nd preferred route through district.	Significant visual impact is associated with Connector B while the route's environmental consequences would generally be low or low-to-moderate. Sentinel Plain is an area of average scenic quality; high visibility occurs where the route parallels I-8. Connector B crosses a proposed National Natural Landmark and the northernmost range of Sonoran pronghorn. This route would also remove approximately 1 acre of farmland and be visible from a contemporary Native American habitation.	\$14,977,000
CONNECTOR C	*Connector C (Link 7)	19.0	L -	L-M - Crosses 0.7 mile of special-status desert wash plant habitat; crosses possible Gila monster habitat.	L -	L-M - Crosses 1.3 miles, removing .49 acres.	N -	L -	L -	L -	N -	So. Pacific Pipeline Co. - induced voltages. So. Pacific Transportation Co. - interference with electric and communication equipment. Arizona Wildlife Federation - preferred route.	The environmental consequences associated with Connector C can be summarized as low or low-to-moderate. The route would remove approximately one-half acre of farmland. Connector C crosses both special-status plant habitat and possible Gila monster habitat.	\$ 5,339,000
CONNECTOR D	Connector D (Links 21, 20)	8.1	L-M -	M-L - Crosses 1.5 miles of special-status riparian plant habitat.	L - Highly impacts 1 single-family dwelling.	L-M - Crosses 0.9 mile, removing 0.34 acre.	L-M - Crosses F. J. Weller Greenbelt.	M-H - High scenic quality where crosses Gila River; structures contrast.	L - Crosses area with a high probability of encountering sites.	M - Crosses undisturbed traces of Gila Trail and the location of Butterfield stage station.	N -	-	Connector D can be characterized as having moderate environmental consequences. Moderate-to-high visual impact is the highest impact characterization for the route. In crossing the Gila River, the route would impact an area of high scenic quality, the F. J. Weller Greenbelt and a special-status riparian plant habitat. In addition, the route would cross 2 historic sites, an area with a high probability of encountering sites, and impact 1 single-family dwelling. Approximately one-third acre of farmland would be removed by Connector D.	\$ 2,276,000
CONNECTOR E	*Connector E (Links 23, 26)	26.7	L -	L -	L - Highly impacts 3 single-family dwellings and crosses airstrip.	L-M - Crosses 3.0 miles, removing 1.04 acres.	N -	M - Average scenic quality in close proximity to residences.	L-M -	L -	L -	So. Pacific Pipeline Co. - induced voltages to pipeline. WMID - 2nd preferred route through district. So. Pacific Transportation Co. - interference with communication and electronic equipment. Arizona Game and Fish - Gila River wildlife. Arizona Wildlife Federation - preferred route.	Connector E is predicted to have low-to-moderate environmental consequences. The route is in close proximity of residences and has average scenic quality. Connector E would impact 3 single-family dwellings and remove approximately 1 acre of farmland.	\$ 7,593,000
CONNECTOR F	Connector F (Links 22, 25a)	38.3	L-M -	M-L - Crosses northernmost range of Sonoran pronghorn and possible Gila monster habitat.	L -	N -	L -	M - Structures contrast where route parallels I-8 through Mohawk Mountains.	L-M - Crosses area with a moderate probability of encountering sites.	L -	L -	So. Pacific Transportation Co. - interference with electric and communication equipment. Wellton-Mohawk Irrigation District - preferred route. ADOT - traffic disruption.	Connector F would have high visibility where it parallels I-8 through the Mohawk Mountains, an area which has a moderate probability of encountering archaeological sites. The route crosses the northernmost range of the Sonoran pronghorn and possible Gila monster habitat. Other than these impacts, Connector F would have low environmental consequences.	\$10,762,000

*Environmentally Preferred Route

Table 3-9 (Continued)

SET OR CONNECTOR	ALTERNATIVE ROUTE	LENGTH OF ROUTE	ENVIRONMENTAL CONSEQUENCES										ESTIMATED COSTS	
			GEOTECHNICAL FEATURES	ECOLOGICAL RESOURCES	SOCIAL AND ECONOMIC LAND USES	AGRICULTURAL RESOURCES	PARK, PRESERVATION AND RECREATION LAND USES	VISUAL CHARACTERISTICS	ARCHAEOLOGICAL RESOURCES	HISTORICAL RESOURCES	NATIVE AMERICAN CULTURAL RESOURCES	AGENCY/PUBLIC COMMENTS		SUMMARY
SET III	Rt. 1 (Links 28, 74)	21.2	M-L 5	M-L 5 Crosses 2.8 miles of special-status upland and riparian plant habitats; crosses 12.9 miles of bighorn sheep habitat; crosses possible elephant tree habitat.	L 5 Highly impacts 3 single-family dwellings.	L-M 3 Crosses 1.4 miles, removing 0.83 acre.	N -	M-H 1 Class A scenic quality; landform and structures contrast.	H-M 5 Previously recorded sites; plants with commercial value.	L 1	H-M 5 Visible from 2 sacred places; crosses 3 other sites.	U. S. Fish & Wildlife Service - bighorn sheep. Arizona Game and Fish - Gila River wildlife habitats. Wellton-Mohawk Irrigation District - second choice of route through district. Dept. of Navy - infringes on Yuma Proving Ground.	Rt. 1 is predicted to have moderate-to-high environmental consequences. Several significant impacts to archaeological, Native American and visual resources would be associated with the route. High impacts to archaeological resources are predicted for approximately 50 percent of the route's length. Rt. 1 would be visible from 2 Native American sacred places and crosses 3 other sites. The route crosses an area of Class A scenic quality. In addition, it crosses special-status plant and bighorn sheep habitat, and, potentially, the habitat of special-status plant species. Rt. 1 impacts 3 single-family dwellings and removes approximately 1 acre of farmland.	\$ 6,536,000
	Rt. 2 (Links 28, 36, 37)	19	M-L 4	M-L 4 Crosses 3.1 miles of special-status plant habitats; crosses 12.9 miles of bighorn sheep habitat; crosses possible elephant tree habitat.	L 2 Highly impacts 3 single-family dwellings.	L-M 1 Crosses 1.4 miles, removing 0.83 acre.	N -	M-H 3 Class A scenic quality; structures and landform contrast.	H-M 4 Previously recorded sites; plants with commercial value.	M 3 Crosses possible Sand Papago village location.	M-H 4 Visible from 2 sacred places; crosses 2 other sites.	U. S. Fish & Wildlife Service - bighorn sheep. Arizona Game and Fish - Gila River wildlife habitats. Dept. of Navy - infringes on Yuma Proving Ground. Wellton-Mohawk Irrigation District - interference with agricultural operations.	Rt. 2 would have moderate-to-high environmental consequences, with several significant impacts. The area crossed is of Class A scenic quality and would result in a moderate-to-high impact to visual resources. High impact to archaeological resources is predicted for approximately 50 percent of the route's length. Several Native American sites and 1 historic site are crossed. Bighorn sheep and special-status plant habitats are also crossed. This route would remove approximately one-half acre of farmland.	\$ 6,048,000
	Rt. 3 (Links 29, 30a, 30b, 74)	23.8	L-M 3	M-L 2 Crosses 0.8 miles of special-status desert wash and riparian plant habitats.	L 4 Highly impacts 3 single-family dwellings.	L-M 4 Crosses 1.7 miles, removing 0.98 acre.	N -	M-H 2 Proximity to residences; structures contrast.	M 2 Previously recorded sites; plants with commercial value.	L 1	M-H 3 Visible from 2 sacred places; crosses 2 other sites.	Wellton-Mohawk Irrigation District - third choice through district.	While Rt. 3 can be characterized as having moderate environmental consequences, significant impacts to the visual, Native American and archaeological resources would be associated with this routing. Special-status plant habitats are crossed by this route. In addition, Rt. 3 would impact 3 single-family dwellings and remove approximately 1 acre of farmland.	\$ 7,227,000
	Rt. 4 (Links 29, 30a, 30b, 36, 37)	21.6	L-M 2	M-L 1 Crosses 0.9 mile of special-status desert wash and riparian habitat.	L 1	L-M 2 Crosses 1.7 miles, removing 0.98 acre.	N -	M-H 4 Class B scenic quality; proximity to residences, structures and landform contrast.	M 1 Previously recorded sites; plants with commercial value.	M 3 Crosses possible Sand Papago village location.	M 2 Visible from 2 sacred places.	Wellton-Mohawk Irrigation District - interference with agricultural operations.	Significant impacts associated with Rt. 4 are predicted for visual, archaeological, historic and Native American resources. In addition, close to 1 acre of farmland would be removed and 0.6 mile of special-status plant species crossed. In general, Rt. 4 would have moderate environmental consequences and is the environmentally preferred route between Routes 1-5 in Set III.	\$ 6,739,000
	Rt. 5 (Links 29, 31a, 31b, 35, 37)	22.7	L 1	M-L 3 Crosses 5.8 miles of special-status desert wash, upland, and riparian plant habitats; crosses possible elephant tree habitat; possible migratory waterfowl conflicts.	L 3 Highly impacts 1 single-family dwelling.	L-M 5 Crosses 4.2 miles, removing 1.68 acres.	N -	H-M 5 Proximity to residences; structures and landform contrast (new access required).	M-H 3 Previously recorded sites; plants with commercial value.	M 3	M 1 Visible from 2 sacred places.	Wellton-Mohawk Irrigation District - interference with agricultural operations. Arizona Game and Fish - waterfowl, small game, deer and dove habitat.	Several significant impacts are associated with Rt. 5. The route would be visible from residences and 2 sites sacred to Native Americans. One single-family dwelling would be impacted and 1.5 acres of agricultural lands removed. Three types of special-status plant habitats are crossed. High impacts to archaeological resources are predicted for approximately 30 percent of the route.	\$ 7,264,000
	Rt. 6 (Links 29, 31a, 73b, 32b, 33, 39)	26.7	L 1	M-L 1 Crosses 7.7 miles of special-status desert wash, upland and riparian plant habitats; crosses 4.8 miles of low-density bighorn sheep habitat; crosses elephant tree habitat; possible desert tortoise habitat; and flat-tailed horned lizard habitat.	L-M 1 Highly impacts 1 single-family dwelling; crosses 1 proposed subdivision.	L-M - Crosses 2.3 miles, removing 0.79 acre.	L - Crosses proposed golf course.	M-H 2 High viewer-sensitivity from residences; structures contrast.	L-M 2 Previously recorded sites; plants with commercial value.	L 2	N -	Wellton-Mohawk Irrigation District - interference with agricultural operations. Arizona Wildlife Federation - part of preferred route. Southern Pacific Pipeline Co. - induced voltages to existing and future pipeline. Southern Pacific Transportation Co. - interference with communication and electronic equipment. U.S. Fish & Wildlife - bighorn sheep. DOT - least desirable aesthetically, traffic disruption.	Rt. 6 can be characterized as having moderate environmental consequences. The visual impact of the route would be moderate-to-high, resulting from high viewer sensitivity from residences in proximity to the corridor. Rt. 6 would cross three types of special-status plant habitats as well as bighorn sheep and flat-tailed horned lizard habitat. One single-family dwelling would be impacted and approximately 1 acre of farmland removed. In addition, this routing crosses a proposed subdivision and a proposed golf course. Significant impacts to archaeological resources would occur.	\$ 8,041,000
	Rt. 7 (Links 29, 31a, 73b, 73a, 25b, 39)	27.5	L 2	M-L 2 Crosses 7.8 miles of special-status desert wash, upland and riparian plant habitats; crosses 4.8 miles of low-density bighorn sheep habitat; crosses elephant tree habitat; possible desert tortoise habitat; and flat-tailed horned lizard habitat.	L-M 2 Highly impacts 1 single-family dwellings; crosses 1 proposed subdivision.	L-M - Crosses 2.3 miles, removing 0.79 acre.	L - Crosses proposed golf course.	M-H 1 High viewer-sensitivity from residences; structures contrast.	L-M 1 Previously recorded sites; plants with commercial value.	N 1	N -	Wellton-Mohawk Irrigation District - interference with agricultural operations. DOT - least desirable aesthetically, traffic disruption. U. S. Fish & Wildlife - bighorn sheep.	The environmental consequences associated with Rt. 7 are similar to those associated with Rt. 6.	\$ 8,266,000

* Environmentally Preferred Route

SET OR CONNECTOR	ALTERNATIVE ROUTE	LENGTH OF ROUTE	ENVIRONMENTAL CONSEQUENCES										ESTIMATED COSTS	
			GEOTECHNICAL FEATURES	ECOLOGICAL RESOURCES	SOCIAL AND ECONOMIC LAND USES	AGRICULTURAL RESOURCES	PARK, PRESERVATION AND RECREATION LAND USES	VISUAL CHARACTERISTICS	ARCHAEOLOGICAL RESOURCES	HISTORICAL RESOURCES	NATIVE AMERICAN CULTURAL RESOURCES	AGENCY / PUBLIC COMMENTS		SUMMARY
SET IV	Rt. 1 (Links 73a, 73b, 73c, 30b, 74)	16.6	L-M 4	L-M 1	L 4 Highly impacts 4 single-family dwellings.	M-L 3 Crosses 2.9 miles, removing 1.38 acres.	N -	M-H 1 Crosses agricultural lands, high visibility from residences; structures contrast.	M 2 Recorded sites; crosses area with a high probability of encountering sites.	L 1	M-H 4 Visible from 2 sacred places.	Wellton-Mohawk Irrigation District - interference with agricultural operations on Link 73.	Environmental consequences associated with Rt. 1 can be summarized as moderate-to-high. Significant impact would occur to visual, archaeological and Native American resources. Rt. 1 would be visible to residences as well as to 2 sites sacred to Native Americans. The route would potentially impact 4 single-family dwellings and remove approximately 1.5 acres of agricultural lands.	\$4,527,000
	Rt. 2 (Links 73a, 73b, 73c, 30b, 36, 37)	14.4	L-M 3	L-M 2 Crosses 0.4 mile of special-status plant habitat.	L 3 Highly impacts 1 single-family dwelling.	M-L 2 Crosses 2.9 miles, removing 1.17 acres.	N -	M-H 2 Crosses agricultural lands, proximity to residences; structures and landform contrast.	M 1 Recorded sites; crosses area with a high probability of encountering sites.	M 2 Crosses possible Sand Papago village location.	M - Visible from 2 sacred places.	Wellton-Mohawk Irrigation District - interference with agricultural operations on Links 36 and 73. Arizona Game and Fish - waterfowl, small game, deer and dove habitat.	Rt. 2 has environmental consequences similar to those associated with Rt. 1, with the exception that one single-family dwelling would be impacted. In addition, Rt. 2 would cross a possible location of a Sand Papago village and 0.4 mile of special-status plant habitat.	\$4,039,000
	Rt. 3 (Links 73a, 32b, 34, 35, 37)	13.3	L 2	M-L 3 Crosses 0.3 miles of special-status desert wash and upland plant habitats; crosses possible elephant tree habitat.	L 1	N 1	N -	M-H 3 Structures and landform contrast.	H-M 3 Recorded sites; crosses area with a high probability of encountering sites.	M 4	M - Visible from 2 sacred places.	ADOT - aesthetic problems on Links 32b and 34. So. Pacific Pipeline Co. - induced voltages; So. Pacific Transportation Co. - interference with electronic and communication equipment. Arizona Game & Fish - waterfowl and small game. Wellton-Mohawk Irrigation District - interference with agricultural operations on Links 32b, 34 and 73.	Significant impacts are predicted for visual, archaeological, Native American and ecological resources along Rt. 3. Rt. 3 can be characterized as having moderate environmental consequences and is the environmentally preferred route between Routes 1-4 in Set IV.	\$4,086,000
	Rt. 4 (Links 25b, 33, 34, 35, 37)	12.9	L 1	M-L 4 Crosses 0.4 miles of special-status desert wash and upland plant habitats; crosses possible elephant tree habitat.	L 2	N 1	N -	H-M 4 Crosses highway; adjacent to residences; structures and landform contrast.	H-M 4 Recorded sites; crosses area with a high probability of encountering sites.	M-L 3 Crosses possible Sand Papago village location.	M - Visible from 2 sacred places.	See Rt. 3 above.	Rt. 4 crosses the highway and would be adjacent to residences, resulting in high-to-moderate visual impact. Rt. 4 would be visible from 2 sites sacred to Native Americans and cross a possible Sand Papago village location. In addition, this route would cross two types of special-status plant habitats.	\$3,973,000
	Rt. 5 (Links 25b, 39)	12.8	L -	M-L - Crosses 3.4 miles of special-status desert wash and upland plant habitats; crosses 4.8 miles of low-density bighorn sheep habitat; crosses elephant tree habitat; crosses flat-tailed horned lizard habitat.	L-M - Crosses proposed subdivision.	N -	L - Crosses proposed golf course.	M - Passes through high scenic-quality area (Gila Mts.).	L-M - Recorded sites; crosses area with a high probability of encountering sites.	N -	N -	Wellton-Mohawk Irrigation District - Link 25 (with Connector F) preferred route for area. U. S. Fish & Wildlife Service - bighorn sheep. Yuma County Planning Department - impact on major residential development planned near Link 39. ADOT - aesthetic problem on portions of Link 39 near I-8, traffic disruption.	Rt. 5 can be characterized as having moderate-to-low environmental consequences. Significant impacts occur from the route crossing the following areas: the Gila Mountains (high scenic quality), a proposed subdivision and golf course, two special-status plant habitats, bighorn sheep habitat and a high probability of encountering archaeological resources.	\$3,597,000
SET V	Rt. 1 (Links 40a, 40b, 41, 46, 45, 44, 43)	8.5	L 3	L-M -	L 2	M 3 Crosses 3.5 miles, removing 2.19 acres.	N -	H 3 Proximity to residences; structures contrast.	L-M 3	N 1	M-L 1 Visible from 1 sacred place.	Arizona Wildlife Federation - Links 43, 44, 45 part of preferred route. Yuma Irrigation District - crossing district.	High visual impact characterizes Rt. 1. The route would be close to residences and have a structures contrast. A little over two acres of agricultural lands would be removed by this routing. In addition, Rt. 1 would be visible from one site sacred to Native Americans.	\$2,389,000
	Rt. 2 (Links 40a, 40b, 42, 44, 43)	7.7	L 2	L-M -	L 1	M 2 Crosses 2.5 miles, removing 1.69 acres.	N -	H 2 Proximity to residences; structures contrast.	L 1	N 1	M-L 1 Visible from 1 sacred place.	See Set V, Rt. 1 above.	Significant impacts of Rt. 2 are similar to those associated with Rt. 1; however, less agricultural land would be removed in Rt. 2.	\$2,165,000
	* Rt. 3 (Links 38, 43)	6.4	L 1	L-M -	L 3	L-M 1 Crosses 0.9 miles, removing 0.34 acres.	N -	M-H 1 Proximity to residences; structures contrast.	L-M 2	L 3	M 3 Visible from 2 sacred places.	So. Pacific Transportation Co. - interference with electronic and communication equipment. U. S. Army - transmission-line construction compatible with ammunition operations at Blaisdell.	Rt. 3 has significant impacts on the same resources as Routes 1 and 2. However, visual and agricultural impacts would be quantitatively less. Rt. 3 is the environmentally preferred route for Set V.	\$1,799,000
CONNECTOR G	* Connector G (Link 56)	1.9	L -	L - Crosses possible 1.9 miles of flat-tailed horned lizard habitat.	L -	N -	N -	M -	L -	N -	N -	Yuma-Mesa Irrigation District - interference with agricultural operations. ADOT - traffic disruption.	Connector G is predicted to have low or no environmental consequences to all resources except visual, which would have by moderate impacts.	\$ 534,000
SET VI	Rt. 1 (Links 57, 61)	8.2	L 2	L -	M - Highly impacts 3 single-family dwellings and 1 institution; crosses 1 mobile-home park.	M 2 Crosses 5.9 miles, removing 1.52 acres.	L -	H 2 High visibility and sensitivity from residences; crosses agricultural lands; structures contrast.	L -	N -	N -	Yuma-Mesa Irrigation District and Unit B Irrigation District - interference with agricultural operations. So. Pacific Transportation Co. - interference with communications and electronic equipment.	Rt. 1 has high visibility from residences; visual impact would result from a structures contrast for the entire length of the route. Three single-family dwellings and one institution would be impacted, and one mobile-home park crossed. One and one-half acres of farmland would be removed. Rt. 1 also crosses 3 RV parks.	\$2,305,000
	* Rt. 2 (Links 59, 60)	6.9	L 1	L - Crosses 4.2 miles of possible flat-tailed horned lizard habitat.	M - Highly impacts 5 single-family dwellings; crosses 2 subdivisions (no houses impacted).	M 1 Crosses 3.4 miles, removing 1.52 acres.	N -	H-M 1 Proximity to residences; located in agricultural lands; structures contrast.	L -	N -	N -	Yuma-Mesa Irrigation District and Unit B Irrigation District - interference with agricultural operations. Yuma Co. Planning - planned residential development.	The visual impact of Rt. 2 is characterized by structures contrast. Rt. 2 would impact 5 single-family dwellings and cross two subdivisions (no houses impacted). One and one-half acres of farmland would be removed and possible flat-tail horned lizard habitat would be crossed. Rt. 2 is the environmentally preferred route in Set VI.	\$1,939,000
CONNECTOR H	* Connector H (Links 62, 63)	7.0	L -	L -	L-M - Highly impacts 10 single-family dwellings.	M - Crosses 4.2 miles, removing 1.32 acres.	N -	H-M - Proximity to residences; structures contrast.	L-M -	N -	N -	MCAS - concern for microwave interference. Yuma Co. Water Users Association, Unit B Irrigation District and Yuma-Mesa Irrigation and Drainage District - interference with agricultural operation. Somerton - growth barrier to the north.	The environmental consequences associated with Connector H can be summarized as moderate-to-low. A significant visual impact would occur where residences are in close proximity to the route. Ten single-family dwellings would be displaced, and approximately 1.5 acres of agricultural lands impacted.	\$1,967,000
SET VII	Rt. 1 (Links 66, 70)	9.3	L 2	L-M 3 Potential waterfowl collision hazard; crosses 0.2 mile of Colorado River riparian habitat; marginal Yuma clapper rail habitat.	L-M 3 Highly impacts 6 single-family dwellings.	M 3 Crosses 9.1 miles, removing 6.0 acres.	L 2	H 3 High scenic quality; agricultural lands; high visibility to residences; structures contrast.	L -	N -	M-H 3 Visible from and adjacent to Native American cemetery.	Yuma Co. Water Users Association - interference with agricultural operations. U. S. Fish and Wildlife - Colorado River riparian and waterfowl habitats.	Rt. 1 would have significant unavoidable adverse impacts to visual and agricultural resources, socioeconomic land use and Native American resources. The area is distinguished by high scenic quality and is highly visible to residences. Colorado River riparian habitat would be crossed. Six acres of agricultural lands would be removed, and six single-family dwellings impacted. Rt. 1 is visible from a Native American cemetery.	\$2,613,000
	Rt. 2 (Links 65, 67, 68, 70)	8.5	L 1	L-M 2 Potential waterfowl collision hazard; crosses 0.2 mile of Colorado River riparian habitat; marginal Yuma clapper rail habitat.	L 1 Highly impacts 2 single-family dwellings; crosses an airstrip.	M 2 Crosses 7.7 miles, removing 4.88 acres.	L -	H 1 High scenic quality; agricultural lands with associated residences; structures contrast.	L -	N -	M-H 3 Visible from and adjacent to Native American cemetery.	See Set VII, Rt. 1 for comments.	Rt. 2 would have environmental consequences similar to those associated with visual and Native American resources of Route 1. Four acres of agricultural lands would be removed, and two single-family dwellings impacted. In addition, Rt. 2 would cross an airstrip used for agricultural operations.	\$2,389,000
	* Rt. 3 (Links 65, 67, 69)	8.6	L 3	L-M 1 Potential waterfowl collision hazard; crosses 0.3 mile of Colorado River riparian habitat; marginal Yuma clapper rail habitat.	L - Highly impacts 2 single-family dwellings; crosses an airstrip.	M 1 Crosses 7.5 miles, removing 4.72 acres.	L 3	H 2 High scenic quality; agricultural lands with associated residences; structures contrast.	L -	N -	M-L 1 Visible from Native American cemetery.	Yuma County Water Users Association - interference with agricultural operations. U. S. Fish & Wildlife Service - riparian habitat along Colorado River. Arizona Game & Fish - Link 69 preferred for river crossing. USMC - Airspace interference.	Rt. 3 has significant impacts similar to those associated with Rt. 2. However, Link 69 of Rt. 3 is the preferred river-crossing for ecological and Native American resources. Link 69 follows an existing transmission corridor and connects with routes in California that minimize significant impact to Native American resources. Rt. 3 is the environmentally preferred route within Set VII.	\$2,417,000

SET OR CONNECTOR	ALTERNATIVE ROUTE	LENGTH OF ROUTE	ENVIRONMENTAL CONSEQUENCES											ESTIMATED COSTS
			GEOTECHNICAL FEATURES	ECOLOGICAL RESOURCES	SOCIAL AND ECONOMIC LAND USES	AGRICULTURAL RESOURCES	PARK, PRESERVATION AND RECREATION LAND USES	VISUAL CHARACTERISTICS	ARCHAEOLOGICAL RESOURCES	HISTORICAL RESOURCES	NATIVE AMERICAN CULTURAL RESOURCES	AGENCY / PUBLIC COMMENTS	SUMMARY	
SET VIII	Rt. 1 (Links 124, 127)	10.4	L 1	L 3 Crosses 6.5 miles of special-status plant habitat, including 0.2 mile of Colorado River riparian habitat; crosses 6.3 miles of Andrews scarab beetle habitat; possible waterfowl collision hazard; and marginal Yuma clapper rail habitat.	L 1	N -	H-M 3 Crosses high-use ORV area.	H-M 3 Class A scenic quality along river and in dunes; structures contrast.	M-H 2 Crosses area designated by BLM as having "very high" sensitivity; (proposed ACEC).	H-M 2 Crosses historic Quechan multiple-resource area (proposed ACEC).	H-M 3 Crosses Ft. Yuma Indian Reservation, multiple-resource area, and rock-art area.	Imperial Irrigation District - crosses All-American Canal, California Game and Fish - Yuma clapper rail.	Environmental consequences for Rt. 1 can be characterized as high-to-moderate with several significant impacts. The Colorado River and the Sand Dune areas have Class A scenic quality; the visual impact of Rt. 1 is high-to-moderate. Rt. 1 crosses an area of high ORV use. Rt. 1 would cross an historic Quechan multiple-resource area, and a sensitive archaeological area. Special-status plant and wildlife habitats would be crossed.	\$ 4,003,000
	Rt. 2 (Links 124, 125, 126)	11.5	L 2	L 2 Crosses 7.6 miles of special-status plant habitat, including 0.2 mile of Colorado River riparian habitat; crosses 7.4 miles of Andrews scarab beetle habitat; possible waterfowl collision hazard; marginal Yuma clapper rail habitat.	L 2	N -	M-H 1 Crosses high-use ORV area.	M-H 1 Class A scenic quality along river and in dunes; structures contrast.	M-H 3 Crosses area designated by BLM as having "very high" sensitivity; (proposed ACEC).	H-M 3 Crosses historic Quechan multiple-resource area (proposed ACEC).	H-M 3 Crosses Ft. Yuma Indian Reservation, multiple-resource area, and rock-art area.	Imperial Irrigation District - crosses All-American Canal, California Game and Fish - Yuma clapper rail.	The environmental consequences of Rt. 2 are very similar to those associated with Rt. 1. Rt. 2 is distinguished by a slightly lower impact characterization for visual, and park, preservation and recreation land-use resources.	\$ 4,530,000
	Rt. 3 (Links 123, 134, 126)	11.7	L 3	L 1 Crosses 4.6 miles of special-status plant habitat, including 0.2 mile of Colorado River habitat; crosses 3.8 miles of Andrews scarab beetle habitat; possible waterfowl collision hazard; marginal Yuma clapper rail habitat.	L-M 3 Crosses Indian reservation.	N -	M-H 2 Crosses high-use ORV area and 1 RV park site.	M-H 2 Class A scenic quality along river and in dunes; structures contrast.	M-H 1 Crosses area designated by BLM as having "very high" sensitivity; (proposed ACEC).	L 1 Crosses historic Quechan multiple-resource area (proposed ACEC).	H-M 1 Crosses Ft. Yuma Indian Reservation, multiple-resource area, and rock-art area.	Imperial Irrigation District - crosses All-American Canal, California Game and Fish - Yuma clapper rail.	Environmental consequences for Rt. 3 can be characterized as moderate-to-high. While significant impacts are similar to those associated with Rt. 2, impacts to historic and ecological resources would be less significant. The historic Quechan multiple-resource area is crossed by Rt. 3. Fewer miles of special-status plant and wildlife habitats would be crossed. Rt. 3 is the environmentally preferred route within Set VIII.	\$ 4,317,000
CONNECTOR I	*Connector I (Link 128)	22.1	L -	M - Crosses 1.1 mile of special-status plant habitat; crosses 1.1 mile of Andrews scarab beetle habitat; and crosses 17.3 miles of flat-tailed horned lizard habitat.	N -	N -	L - Crosses proposed ORV area.	L-M - High visual sensitivity and scenic quality of dunes; structures contrast.	M-H - Crosses area designed by BLM as having "very high" sensitivity; (proposed ACEC).	L-M - Visible from California historical landmark.	N -	Imperial Irrigation District - crosses All-American Canal, moving IID 92kV line.	Connector I would cross a sensitive archaeological area and be visible from a California historic landmark. Special-status plant habitat and two types of special-status wildlife habitat are crossed. Connector I can be summarized as having moderate environmental consequences.	\$ 7,057,000
SET IX	*Rt. 1 (Links 129, 133, 138)	40.9	L 1	L-M 1 Crosses 14.6 miles of flat-tailed horned lizard habitat.	L 1 Highly impacts 2 single-family dwellings.	M 2 Crosses 22.4 miles, removing 10.14 acres.	L-M 1	H-M 1 High sensitivity of residences in agricultural lands; structures contrast.	M 1	L 2 Crosses historic Quechan multiple-resource area (proposed ACEC).	L-M 1 Multiple-resource area crossed.	City of Calexico - interference for potential expansion. Imperial County - support east-west corridor which avoids all agricultural land. DOT - crosses I-8. California Fish and Game - preferred route. Scoping meeting issues: interference with agricultural operations, electromagnetic effects, urban and visual impacts.	While the environmental consequences associated with Rt. 1 can generally be characterized as moderate, several significant impacts are associated with this routing. Route 1 has a high-to-moderate impact characterization for visual resources due to the high sensitivity of nearby residences and a strong structure contrast. Ten acres of agricultural lands would be removed, and two single-family dwellings impacted. One special-status wildlife habitat would be crossed. Rt. 1 is the environmentally preferred route within Set IX.	\$13,231,000
	Rt. 2 (Links 130, 132, 136, 138)	58.8	L 2	M-L 2 Crosses 2.6 miles of special-status desert riparian plant habitat; crosses 19.7 miles of flat-tailed horned lizard habitat; crosses Yuma clapper rail habitat.	L 2 Highly impacts 3 single-family dwellings.	M 3 Crosses 28.4 miles, removing 14.92 acres.	L-M 1	H-M 2 High sensitivity of residences in agricultural lands; structures contrast.	M-H 2 Crosses area designed by BLM as having "very high" sensitivity.	N 1	L-M 2 Visible from 3 sites.	Imperial County - support east-west corridor which avoids all agricultural land. California Game and Fish - Yuma clapper rail. Department of Navy - adjacent to range, hazard to aircraft operations, recommends no approval. Scoping meeting issues: electromagnetic effects, urban and visual impacts, and interference with agricultural operations.	The environmental consequences associated with Rt. 2 can be characterized as moderate-to-high. The impact characterization for visual resources is similar to Rt. 1. Rt. 2 is distinguished by a greater quantity of significant impact and the addition of a significant impact for archaeological resources. An area of "sensitive" archaeological resources is traversed. Approximately 15 acres of agricultural land would be removed, and three single-family dwellings impacted. Rt. 2 crosses one special-status plant habitat and two special-status wildlife habitats.	\$18,986,000
	Rt. 3 (Links 130, 132, 135, 116)	76.8	L 3	M-L 3 Crosses 2.6 miles of special-status desert riparian plant habitat; crosses 14.6 miles of flat-tailed horned lizard habitat; crosses Yuma clapper rail habitat.	L-M 3 Highly impacts 3 single-family dwellings.	M 1 Crosses 19.3 miles, removing 8.61 acres.	M-L 3	H-M 3 High sensitivity of residences in agricultural lands; structures contrast.	H 3 Crosses area designated by BLM as having "very high" sensitivity; (proposed ACEC).	M-H 3 Crosses traces of Southern Emigrant Trail.	M-H 3 Visible from 3 sacred places.	See Set IX, Rt. 2 above. Imperial County - support east-west corridor which avoids all agricultural land. Department of Navy - plans to expand operation to north of Link 116, recommends no approval. Scoping meeting issues: urban and visual impacts; electromagnetic effects and interference with agricultural operation.	Moderate-to-high environmental consequences are predicted for Rt. 3. Significant, unavoidable, adverse impacts occur for all but one resource. Visual impact characterization is similar to both Routes 1 and 2. An area of "sensitive" archaeological resources is predicted for nearly 50% of the route. The route would be visible from three sites considered sacred by Native Americans and crosses traces of the Southern Emigrant Trail. Three single-family dwellings would be impacted and 8½ acres of farmland removed. Rt. 3 crosses special-status plant and wildlife habitats.	\$24,961,000
CONNECTOR J	*Connector J (Links 140, 141)	18.6	L -	M-H - Crosses 13.8 miles of special-status plant habitat; crosses 10.6 miles of bighorn sheep habitat; crosses 10.0 miles of magic gecko habitat; crosses 4.8 miles of flat-tailed horned lizard habitat; crosses 6.9 miles of raptor habitat.	L -	N -	M-L - Crosses BLM closed ORV area and outstanding natural area.	H-M - High scenic quality in In-Ka-pah Gorge; structures and landform contrast.	H - Crosses area designated by BLM as having "very high" sensitivity.	L -	H-M - Crosses 2 sacred places and 1 multiple-resource area; visible from 6 other sites.	California Game and Fish - bighorn sheep. DOT - problems crossing I-8. Ocotilla residence - interference with radio, T.V. and CB reception.	Connector J has significant impacts within visual, archaeological, ecological, and Native American resources. High scenic quality within In-Ka-pah Gorge (a strong structure and landform contrast) would result in a high-to-moderate visual impact. In addition to Connector J crossing an area of "sensitive" resources, high impacts are predicted for archaeological resources along almost the entire route. Connector J would cross special-status plant habitat for 15.7 miles. Bighorn sheep, magic gecko, flat-tail horned lizard and raptor habitats would be crossed. Two sites sacred to Native Americans would be crossed, and Connector J is visible from six other sites.	\$ 6,711,000
SET X	*Rt. 1 (Link 142)	3.5	L 2	H 1 Crosses 3.5 miles of special-status plant habitat; crosses raptor nesting area.	L -	N -	N -	H 1 High visibility and sensitivity of Jacumba residences; structures and landform contrast.	H - Crosses area BLM has identified as "severe density" of archaeological resources.	M -	H 2 Crosses multiple-resource area and burial sites; visible from sacred place.	San Diego County Planning Department - "sensitive" archaeological areas. Associated Glider Clubs - interference with glider operations.	Significant impacts are predicted for visual, archaeological, ecological and Native American resources. Rt. 1 is visible from residences in Jacumba. An area identified as having "severe density" of archaeological resources would be crossed. Several Native American sites may be crossed, and Rt. 1 would be visible from one site sacred to Native Americans. Special-status plant and special-status wildlife habitats are crossed for the entire length of the route. Route 1 is the environmentally preferred route within Set X.	\$ 1,450,000
	Rt. 2 (Link 143)	3.4	L 2	H 2 Crosses 3.4 miles of special-status plant habitat; crosses raptor nesting area.	L -	N -	N -	H 2 High visibility and sensitivity of Jacumba residences; structures and landform contrast.	H - Crosses area BLM has identified as "severe density" of archaeological resources.	M -	H 1 Crosses multiple-resource area; visible from sacred place.	City of Jacumba - TV reception. Associated Glider Clubs - interference with glider operations; concern for visual impact.	Significant, unavoidable, adverse impacts associated with Rt. 2 are virtually identical with those associated with Rt. 1.	\$ 1,292,000

Table 3-9 (Continued)

SET OR CONNECTOR	ALTERNATIVE ROUTE	LENGTH OF ROUTE	ENVIRONMENTAL CONSEQUENCES											ESTIMATED COSTS
			GEOTECHNICAL FEATURES	ECOLOGICAL RESOURCES	SOCIAL AND ECONOMIC LAND USES	AGRICULTURAL RESOURCES	PARK, PRESERVATION AND RECREATION LAND USES	VISUAL CHARACTERISTICS	ARCHAEOLOGICAL RESOURCES	HISTORICAL RESOURCES	NATIVE AMERICAN CULTURAL RESOURCES	AGENCY/PUBLIC COMMENTS	SUMMARY	
CONNECTOR K	• Connector K (Link 144)	23.5	L-M -	M - Crosses 20.6 miles of special-status plant habitat; crosses 6.2 miles of raptor nesting area.	- Highly impacts 1 mobile home.	-	N - Crosses Pacific Crest Trail.	H-M - Proximity to residences; new access required; structures, vegetation, and landform contrast.	M-H - Crosses area where recorded sites include cairns, a rock circle and temporary camps.	M - -	M-H - Visible from 1 sacred site, Indian reservation, and prominent trail marker; potential physical disturbance to rock shelter area.	Individual property-owners - expressed concerns for biological, health and electrical effects, incompatible land use and visual impacts.	Connector K can be summarized as having moderate-to-high environmental consequences. Visual impact is characterized as high-to-moderate. Both special-status plant and wildlife habitat would be crossed. Connector K would highly impact one mobile home and cross an area where recorded archaeological sites occur. The Pacific Crest Trail would be crossed, and the route would be visible from several Native American sites.	\$8,207,000
SET XI	• Rt. 1 (Link 145)	11.7	L 1	H-M 2 Crosses 10.4 miles of special-status plants habitat; crosses 10.8 miles of raptor habitat.	L 2 Highly impacts 1 mobile home.	N -	L 1 Crosses proposed National Natural Landmark.	H-M 2 High scenic quality and sensitivity to residences; structures, vegetation, and landform contrast.	M-L 1 Crosses area where sites have been recorded.	M 2	M 1 Visible from 2 sacred places; crosses contemporary village.	Individual property-owners (Dylzura) - concern for visual and land-use impact. Individual property owners - expressed concerns for biological, health and electrical effects, incompatible land use and visual impacts.	Rt. 1 would impact the high scenic quality of the area and be visible from residences. Special-status plant and wildlife habitat would be crossed. Rt. 1 would be visible from two sites sacred to Native Americans. One mobile home would be highly impacted. Rt. 1 of Set XI is the environmentally preferred route.	\$4,253,000
	Rt. 2 (Link 146)	14.8	L 2	H-M 1 Crosses 14.5 miles of special-status plant habitat; crosses 6.2 miles raptor habitat.	L 1	N -	M-L 2 Crosses Coachama Experimental Forest; crosses proposed National Natural Landmark.	H-M 1 High scenic quality in Coachama Experimental Forest and high scenic quality and sensitivity for proposed National Natural Landmark; structure, vegetation and landform contrast.	M-L 2 Crosses areas where high probability of sites is expected.	L 1	M-H 2 Crosses sacred Tecate Peak and contemporary village.	Tecate Planning Group - concern for visual impact. U. S. Border Patrol - interference with border monitoring devices. Individual property-owners - use public land and stay along International Border.	Rt. 2 impacts the high scenic quality of both the Coachama Experimental Forest (Class I) and a proposed National Natural Landmark. Special-status plant habitat and special-status wildlife habitat would be crossed. Rt. 2 would also cross Tecate Peak, a mountain sacred to Native Americans and an area with a high probability of archaeological sites.	\$5,380,000
CONNECTOR L	• Connector L (Link 147)	2.6	L -	M - Crosses 0.5 miles of raptor habitat.	-	N -	L - Crosses a California hiking and riding trail.	H-M - Moderate scenic quality and high sensitivity; structures, vegetation, and landform contrast.	M-L -	M-L -	N -	Individual property-owners - expressed concerns for biological, health and electrical effects, incompatible land use and visual impacts.	Connector L can be characterized as having moderate environmental consequences. While low impact is predicted for several resources, Connector L would have significant impacts to the visual and ecological resources. Connector L would cross a California hiking and riding trail.	\$ 908,000
SET XII	Rt. 1 (Link 148)	4.5	L 2	H-M 1 Crosses 6.7 miles of special-status plant habitat; crosses 4.3 miles of raptor habitat.	L -	N -	N -	H 2 Moderate scenic quality (Jamul Mts.) and high sensitivity; structures, vegetation and landform contrast.	M 2	L 1	H-M 2 Visible from cemetery and Indian Reservation; physical disturbance to cremation/burial area.	Sweetwater Planning Group - concern for biological, health and electrical effects, incompatible land use and visual impacts.	Significant impacts would occur to visual, ecological and Native American resources on Rt. 1. Structures, vegetation and landform contrast would occur for almost the entire route, resulting in high impacts to visual resources. Special-status plant habitat is crossed for the entire length of the route and special-status wildlife habitat is crossed for over half the length of the route.	\$2,479,000
	• Rt. 2 (Link 149)	4.5	L 1	H 2 Crosses 4.4 miles of special-status plant habitat; crosses 4.5 miles of raptor habitat.	L -	L 1	N -	H 1 Moderate scenic quality (Jamul Mts.) and high sensitivity; structures, vegetation, and landform contrast.	M-L 1 Sites identified along this route include temporary camp and isolated artifacts.	H-M 2 Crosses area adjacent to unique 19th century cement plant (Jamul Cement Works).	M-H 1 Visible from 1 sacred place.	Sweetwater Planning Group - concern for Miguel Substation expansion. Individual property-owners - expressed concerns for biological, health and electrical effects, incompatible land use and visual impacts.	Significant impacts to visual and ecological resources in Rt. 2 are qualitatively similar to those in Rt. 1; however, due to the difference in route length, the quantitative impact would be less in Rt. 2. Rt. 2 would be adjacent to a unique historic resource, and be visible from a mountain sacred to Native Americans as well as significantly impact archaeological resources. Rt. 2 is the environmentally preferred route within Set XII.	\$1,572,000
CONNECTOR M	• Connector M (Link 150)	3.2	L -	M - Crosses 2.8 miles of special-status plant habitat.	-	N -	N -	H-M - High visual sensitivity (Miguel Mts.); structures and vegetation contrast.	H - Crosses area BLM has identified as "severe density" of archaeological resources; includes lithic scatters and temporary camps.	L -	M-L - Visible from sacred mountain.	Individual property-owners - expressed concerns for biological, health and electrical effects, incompatible land use and visual impacts.	Connector M would cross an area identified as having "severe density" of archaeological resources. High visual sensitivity exists. Special-status plant habitat would be crossed. Connector M would be visible from a mountain sacred to Native Americans. Because of these significant impacts, Connector M is characterized as having moderate-to-high environmental consequences.	\$1,118,000
CONNECTOR N	• Connector N (Link 151)	23.9	L -	M - Crosses 19.0 miles of special-status plant habitat; crosses 9.6 miles of raptor habitat.	-	N -	L - Crosses golf course, proposed county park and county park.	L -	M-L - Crosses area BLM has identified as "severe density" of archaeological resources which consist of temporary camps, lithic scatters and a quarry area.	N -	L-M - Visible from sacred mountain; crosses cremation/burial area.	Department of Navy - concern for possible electrical interference. Individual property-owners (La Mesa) - electromagnetic effects and visual impacts.	Connector N can generally be characterized as having moderate-to-low environmental consequences. Significant, unavoidable, adverse impacts, however, are associated with this routing. An area identified as having "severe density" of archaeological resources is crossed. Special-status plant and wildlife habitats would be crossed for a majority of the route. Connector N would cross a golf course, a county park and a proposed county park. Connector N would be visible from a mountain sacred to Native Americans and cross a cremation/burial area.	\$9,019,000

TABLE 5-3
LOCATIONS OF SELECTIVELY COMMITTED MITIGATION
APS/SDG&E INTERCONNECTION PROJECT—ARIZONA

LINK	Access to Follow Landform VISUAL	Close Access Raods			Modify Tower Design		Non- Specular Conductors VISUAL	Modify Tower Plocement				Modify Tower Spocing VISUAL	Reroute Line			Curtoil Construction ECOLOGY	Preconstruct. Field Review	Preconstruct. Field Review
		ECOLOGY	LAND USE	PARKS	ECOLOGY	LAND USE		ECOLOGY	LAND USE	VISUAL	PARKS		LAND USE	PARKS	VISUAL			
1							1.0-49.3	2.5- 2.7 12.0-12.8 42.2-43.0		42.7-43.9 45.3-46.8							1.3- 1.5 3.8- 4.9 5.9- 6.5 7.3- 8.1 10.0-10.8 16.0-29.2 30.1-37.8	
2																		
3							0.5- 3.4	1.8- 2.2		0.5- 1.9							3.8- 4.4 5.2- 5.5	
4							0.7-29.7	10.9-11.1		10.4-20.5								
5							2.4- 7.9	12.6-12.9 14.6-14.9 15.6-15.8									0.0- 2.4	
6							5.3- 8.0	2.2- 2.4 5.1- 5.3					6.4- 6.7 7.5- 7.7					
7							0.0- 0.8 10.2-12.3	2.2- 2.4 3.3- 3.5 4.6- 4.7 6.5- 6.7					10.9-11.1					
8								1.6- 2.1 9.4- 9.6 16.1-16.3				18.9-34.2					17.9-18.3	
9												0.0- 2.2						
10							1.4- 1.9					0.0- 1.9					1.0- 1.9	
12												0.0- 5.3 6.3- 7.6						
13						6.7- 7.4	0.0- 9.4	5.7- 6.0	6.7- 7.4								0.0- 5.3 8.8- 9.4	5.7- 6.0
14							0.0- 1.2											
16						8.1- 8.3 8.9- 9.3	0.0- 8.5 9.6-10.4 11.7-16.0		8.1- 8.3								0.2- 1.8 2.5- 3.6 5.7- 8.3 8.8- 9.0 12.0-16.0	
19							0.0-37.3	23.0-23.3		10.2-15.0 18.6-19.6 25.5-27.0			2.0-10.3				0.0- 1.4 12.4-12.8 22.6-23.7	
20							0.0- 4.2										3.4- 4.2	
21							0.0- 3.5				0.2- 0.7						0.0- 0.4	
22							0.0- 7.3	1.4- 1.6						5.1- 5.2				
23							3.6-16.9			16.0-16.9		16.6-16.7						
25A							0.0-29.0	17.6.17.9									0.0- 0.2 1.4- 1.7 7.2-10.2 11.3-11.7 13.9-14.4 15.4-16.0 19.6-21.7 21.9-22.5 24.3-27.4 28.6-29.5 29.9-31.0	0.0- 0.2 1.4- 1.7 7.1-10.2 11.3-11.7 13.9-14.4 15.4-16.0 19.6-21.7 21.9-23.8

TABLE 5-3 (Continued)

LOCATIONS OF SELECTIVELY COMMITTED MITIGATION
APS/SDG&E INTERCONNECTION PROJECT—ARIZONA (Continued)

LINK	Access to Follow Londform VISUAL	Close Access Roads			Modify Tower Design		Non- Specular Conductors VISUAL	Modify Tower Placement				Modify Tower Spocing VISUAL	Reroute Line			Curtoil Construction ECOLOGY	Preconstruct Field Review GEOTECH.	Preconstruct Field Review ECOLOGY
		ECOLOGY	LAND USE	PARKS	ECOLOGY	LAND USE		ECOLOGY	LAND USE	VISUAL	PARKS		LAND USE	PARKS	VISUAL			
25B							0.7- 2.2	0.0- 0.7		1.9-2.2								
26							0.0- 9.8			0.0- 9.8				0.0- 0.5				
28	1.0-12.7	0.0-12.9	1.3-12.3				0.0-13.1	0.0- 1.3		1.0-12.7					0.0- 1.3		0.0- 1.3	
29				0.0- 9.1			0.0- 9.1	5.2- 5.4 7.1- 7.2		0.8- 9.1						8.2- 9.1		
30A				0.0- 2.8			0.0- 2.8			0.0- 2.8								
30B							0.0- 3.8			0.0- 3.8						0.8- 1.3		
31A										0.0- 2.4								
31B								1.0- 2.7		0.0- 3.3					1.0- 2.7			
32B							0.0- 2.0	0.7- 0.8										
33							0.0- 1.1									0.0- 1.1		
34							0.0- 1.7			0.0- 1.7								
35				0.0- 4.9			0.0- 4.9			0.0- 0.8 2.5- 4.9						0.0- 2.0 2.3- 2.8		
36									0.2- 0.3	0.0- 2.9								
37							0.0- 3.0									0.0- 2.8		
38							0.0- 6.0	3.1- 3.5		0.0- 6.0								
39							0.0- 5.0	6.8- 7.2		0.0- 3.0							0.0- 4.8	
40A										0.0- 0.4								
40B										0.0- 1.4								
41										0.0- 2.0								
42								2.2- 2.3		0.0- 2.9								
43																		
44										0.0- 2.6								
45										0.0- 0.7								
46										0.0- 1.0								
56																		
57						3.8- 4.4			3.8- 4.4	0.2- 4.8				2.2- 2.3				
59										2.4- 5.2								
60										0.0- 1.7								
61						1.1- 1.8			1.1- 1.8	0.0- 3.4								
62										0.0- 3.5								
63						0.0- 0.4			0.0- 0.4	0.0- 3.0								
65										0.0- 3.0								
66										0.0- 9.1								
67										0.0- 1.5								
68																		
69					0.8- 1.1			0.8- 1.1			1.1						0.8- 1.1	
70					0.0- 0.2			0.0- 0.2		0.0- 0.2	0.2						0.0- 0.2	
73A																		
73B										0.0- 1.5								
73C										0.0- 1.5								
74							0.0- 2.5			0.0- 1.4								

TABLE 5-3 (Continued)

LOCATIONS OF SELECTIVELY COMMITTED MITIGATION
APS/SDG&E INTERCONNECTION PROJECT—CALIFORNIA

LINK	Access to Follow Landform VISUAL	Close Access Roads			Modify Tower Design		Non- Specular Conductors VISUAL	Modify Tower Placement				Modify Tower Spacing VISUAL	Reroute Line			Curtail Construction	Preconstruct Field Review	Preconstruct Field Review
		ECOLOGY	LAND USE	PARKS	ECOLOGY	LAND USE		ECOLOGY	LAND USE	VISUAL	PARKS		LAND USE	PARKS	VISUAL	ECOLOGY	GEOTECH.	ECOLOGY
116							0.0- 7.7 14.0-16.8 24.0-27.1										0.0-11.1 13.9-27.1	
123					0.0- 0.2			0.0- 0.2 7.3- 7.4			0.0- 0.1					0.0- 0.2	0.0- 5.9	0.0- 0.2 7.3- 7.4
124					0.0- 0.2		0.0- 1.2	0.0- 0.2 4.1- 4.5			0.0- 0.2	0.0- 1.2				0.0- 0.2	0.0- 3.7	0.0- 0.2 4.1- 4.5
125							0.0- 3.3	0.0- 3.3										0.0- 3.3
126								0.0- 3.7							0.0- 3.7		0.0- 3.7	0.0- 3.7
127							0.7- 5.9	0.0- 5.9										0.0- 5.9
128							0.0- 2.3 20.9-22.1										1.2-21.5	
129							25.0-32.8	0.7- 0.8 6.0- 6.2 19.3-19.8 22.5-22.7									25.0-32.8	
130																	2.0- 3.4	
132								21.4-21.6					5.7- 5.9				0.0-11.8	21.4-21.6
133							0.0- 4.0										0.0- 4.0	
134							0.0- 0.6	0.0- 0.6										0.0- 0.6
135							2.1-14.5										8.9- 9.8 11.5-12.1 13.0-14.5	
136							14.1-19.5		17.7-17.9 19.2-19.4								13.8-19.5	
138		3.2- 4.0					0.0- 4.1										0.0- 4.1	
140			0.2- 2.6 2.9- 4.2				0.0- 8.6	8.0- 8.6									0.0- 8.6	8.0- 8.6
141				0.0- 3.3			0.0- 6.2	0.0-10.0								0.0- 5.0 7.7- 9.1	0.0-10.0	0.0-10.0
142	0.7- 1.9							0.0- 3.5		0.0- 3.5							0.0- 3.5	0.0- 3.5
143	0.8- 2.0							0.0- 3.4		0.0- 3.4							0.0- 3.4	0.0- 3.4
144	19.7-23.0	1.2-23.5						0.0-23.5			21.6-21.7					3.2- 4.6 10.4-13.2 14.3-14.5 15.5-16.8 17.6-18.6 20.6-21.6	0.0-23.5	0.0-23.5
145		8.9-10.2 11.0-11.7						0.0-11.7		0.0-11.7						7.5- 8.1	0.0-11.7	0.0-11.7
146	0.0- 1.5 3.8- 5.2 8.4-10.2	0.0- 5.9 11.0-11.4 8.4						0.0- 5.9 11.0-11.4					0.9			2.1- 2.4 3.4- 4.4 12.8-13.2	0.0-14.8	0.0- 5.9 11.0-11.4 8.4
147											2.1- 2.2						0.0- 2.6	
148	0.0- 7.1	3.8- 4.8						3.8- 6.2									0.0- 7.1	3.8- 6.2
149	0.0- 4.5	0.0- 4.5															0.0- 4.5	
150	0.0- 3.2																0.0- 3.2	
151								0.0- 4.0			6.2- 6.4 15.5-15.7	18.0-20.0 21.1-21.6 23.1-23.7					0.0-23.9	0.0- 4.0

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